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SCIENCE FICTION STORIES

SEPTEMBER, 1970

Vol. 44, No. 3

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EDITORIAL

Putting together this magazine is something of an adventure at times, and very much so during the last couple of months. For instance, last issue, after the issue was set in type and then in page-proofs, we found ourselves with more pages than the issue contained. The answer was to hold the book reviews for this issue and cut the final five pages (in manuscript) of my editorial. Even at that a hasty glance at the contents page might have created the notion that we were skimping on material: half a serial, a novelette, and a short story were the sum total of new fiction.

The reason, of course, was the length of Piers Anthony's novel—almost 90,000 words—which left its first installment all but dominating the issue. And this issue faces a similar problem, for the same reason.

"Orn," as I didn't have space to tell you last issue, will be published in book form by Avon later this year as *Paleo*. And an interesting story lies behind those two titles, both of which are Piers Anthony's.

Originally, Piers says, he set out to write the story of Orn, the intelligent bird, as a novelette or novella. He intended to stay solely with Orn's viewpoint. But another author advised him that this would be a mistake, that human characters were also required in order to hold a reader's attention. I believe this advice was misplaced, but perhaps it was tendered without reference to the actual story. In any case, Piers decided to totally rework his original story into the one you've read here, by adding the entire plotline of the humans from *Omnivore*, cutting back and forth between human viewpoints and Orn's, and by keeping Orn's chapters much shorter. Since I have not read the original story, I cannot say whether the present version represents an improvement, but in all candor I must say that I wish I could have seen more of Orn. Perhaps Anthony is wise to leave us wanting a little more, rather than offering us a surfeit.

When Piers first submitted the novel he

explained that he rather thought it was too long and suggested I cut it to fit. Immediately after reading the novel, I suggested the possibility of diving it into a novella (the first 30,000 words) and a two-part novel (the remaining 60,000 words). Piers suggested calling the novella "Orn," since that had been his original title for the story that had mutated into "Paleo."

I don't like to make cuts for the sake of space requirements. Such cuts are usually antithetical to the story. And the more I wrestled with the problem of abstracting a novella that could stand on its own legs, the less happy I was with the idea. The parallel structure of the novel would suffer, and it would mean borrowing a climax from later in the novel or forcing one prematurely. It seemed to amount to the willful sabotage of a long novel to fit publishing requirements. Finally I decided I would rather run the novel straight, in two very long installments, and leave it at that. But the title, "Orn," stuck with me. I liked it better than "Paleo," and with Piers' permission I've used it here.

Each time we publish a novel—no matter how long it is—we receive letters from some of you asking about the extent to which we've cut it. So, to forestall your questions, I will say that I *did* do some minor editorial cutting in the novel. (Of the four serials which have thus far appeared in AMAZING under my editorship, this is the first in which I have made any cuts. Bob Silverberg's "Up The Line" was edited by Silverberg himself before I read it, Phil Dick's "A. Lincoln, Simulacrum" was actually lengthened by a chapter by Phil and myself, and my own "By Furies Possessed" appeared exactly as I wrote it—the Signet version is very slightly changed by minor copyediting to which I have given my approval.)

I don't make editorial changes lightly,

but after I discussed my few quibbles with Piers, he gave me permission to make what changes I felt necessary. These will be found entirely in Chapter Two, last issue, where I eliminated what I considered to be redundant material. If you've read *Omnivore*, you've missed nothing. And if you have not, the same information, less baldly stated, appears again at relevant points in the body of the novel; it was entirely recapitulatory. It is often difficult for an author, in writing a sequel, to know how much of the previous novel he should review. Knowing as he does exactly what has already happened and what he intends for his present novel, it is difficult for him to take the viewpoint of a new reader and be certain of how much or how little he should retell. In this respect my own objectivity as an editor can be, and I hope was, of value.

At this point I cannot say whether the versions of "Orn" which appears in these pages will be the same as the book version, *Paleo*. Piers informed me that Avon editor George Ernstberger wanted some changes made for book publication, but in a recent conversation George told me he was considering following "my" version and was waiting to see the second half before making up his mind. So there may well be no significant difference in the two versions.

Some of you have asked why, given a novel of this length, we don't either 1) relax our policy and publish it in three or more parts, or 2) cut it to more ordinary lengths. I've already dealt with the second suggestion above; to me the forced cutting of any good novel is akin to performing a lobotomy. I have done it, on assignment, for another magazine. The writer in me was made sick by it.

There are several reasons for our present policy on two-part serials. The most obvious argument against running more installments is our bimonthly schedule.

(CONTINUED ON PAGE 128)

THE OOGENESIS OF BIRD CITY

PHILIP JOSE FARMER

Illustrated by MICHAEL HINGE

The story which follows is a curious document. In 1967, after several years of compilation, Harlan Ellison published Dangerous Visions, an omnibus anthology which was distinguished for, among other things, a new 30,000-word novella by Philip Jose Farmer, "Riders of the Purple Wage." Many fans and critics hailed the story as a new landmark for the author of "The Lovers", and it subsequently won a Hugo. "Riders of the Purple Wage" was based on an extrapolation of the Triple Revolution document, one of many such extrapolations Farmer has stated he could write. In his afterword to the story he mentioned the amount of editing and revising to which he had subjected that story. "I had a number of episodes and of letters from various U.S. Presidents to various bureaus. The letters and replies were to show how the Great Withdrawal was initiated and how the enclosed multileveled cities were begun." These he cut. "A more detailed description of the physical construction of a community, 'The Oogenesis of Beverly Hills, Level 14', was cut out, with the municipally organized jousts between teen-age gangs . . . and about a dozen other chapters." Rewritten to stand on its own feet, the story which follows is effectively the prologue to "Riders of the Purple Wage." In it, we are introduced for the first time to the City of Tomorrow . . .

THE PRESIDENT of the U.S.A. sat at the desk of the mayor of Upper Metropolitan Los Angeles, Level 1. There was no question of where the mayor was to sit. Before the office of mayor could be filled, the electorate had to move into the city.

The huge room was filled with U.S. cabinet heads and bureau chiefs, senators, state governors, industrial and educational magnates, union presidents, and several state GIP presidents. Most of them were watching the TV screens covering one part of the curving wall.

Nobody looked through the big window behind the President, even though this gave a view of half of the city. Outside the municipal building, the sky was blue with a few fleecy clouds. The midsummer sun was just past the zenith, yet the breeze was cool; it was 73 ° F everywhere in the city. Of the 200,000 visitors, at least one-third were collected around tour-guides. Most of the hand-carried football-sized TV cameras of the reporters were focused at that moment on one man.

Government spieler: "Ladies 'n gentlemen, you've been personally conducted through most of this city and you now know almost as much as if you'd stayed home and watched it on TV. You've seen everything but the interior of the houses, the inside of your future homes. You've been amazed at what Uncle Sam, and the state of California, built here, a Utopia, an Emerald City of Oz, with you as the Wizard . . ."

Heckler (a large Negro woman with an M.A. in Elementary School Electronic Transference): "The houses look more like the eggs that Dorothy used to frighten the Gnome King with!"

Spieler (managing to glare and smile at the same time): "Lady, you've been



shooting your mouth off so much, you must be an agent for the Anti-Bodies! You didn't take the pauper's oath; you took the peeper's oath!"

Heckler (bridling): "I'll sue you for defamation of character and public ridicule!"

Spieler (running his gaze up and down her whale-like figure): "Sue, sue, sooie! No wonder you're so sensitive about eggs, lady. There's something ovoid about you!"

The crowd laughed. The President snorted disgustedly and spoke into a disc strapped to his wrist. A man in the crowd, the message relayed through his ear plug, spoke into his wrist transmitter, but the spieler gestured as if to say, "This is my show! Jump in the lake if you don't like it!"

Spieler: "You've seen the artificial lake in the center of the city with the municipal and other buildings around it. The Folk Art Center, the Folk Recreation Center, the hospital, university, research center, and the PANDORA, the people's all-necessities depot of regulated abundance. You've been delighted and amazed with the fairyland of goodies that Uncle Sam, and the State of California, offers you free. Necessities and luxuries, too, since *Luxury Is A Necessity*, to quote the FBC. You want anything—anything!—you go to the PANDORA, press some buttons, and presto! you're rich beyond your dreams!"

Heckler: "When the lid to Pandora's box was opened, all the evils in the world flew out, and . . ."

Spieler: "No interruptions, lady! We're on a strict time schedule . . ."

Heckler: "Why? We're not going anywhere!"

Spieler: "I'll tell you where you can go lady."

Heckler: "But . . ."

Spieler: "But me no buts, lady! You know, you ought to go on a diet!"

Heckler (struggling to control her temper): "Don't get personal, big mouth! I'm big, all right, and I got a wallop, too, remember that. Now, Pandora's box . . ."

The spieler made a vulgar remark, at which the crowd laughed. The heckler shouted but could not be heard above the noise.

The President shifted uneasily. Kingbrook, the 82-year-old senator from New York, harumphed and said, "The things they permit nowadays in public media. Really, its disgusting . . ."

Some of the screens on the wall of the mayor's office showed various parts of the interior of the city. One screen displayed a view from a helicopter flying on the oceanside exterior of Upper Metropolitan LA. It was far enough away to get the entire structure in its camera, including the hundred self-adjusting cylinders that supported the Brobdingnagian plastic cube and the telescoping elevator shafts dangling from the central underbase. Beneath the shadow of box and legs was the central section of the old city and the jagged sprawl of the rest of Los Angeles and surrounding cities.

The President stabbed towards the screen with a cigarette and said, "Screen 24, gentlemen. The dark past below. The misery of a disrupted ant colony. Above it, the bright complex of the future. The chance for every man to realize his full potentiality as a human being."

Spieler: "Before I conduct you into this house, which is internally just like every other private residence . . ."

Heckler: "Infernally, you mean. They all look just alike on the outside, too."

Spieler: "Lady, you're arousing my righteous wrath. Now, folks, you noticed that all the buildings, municipal and private, are constructed like eggs. This futuristic design was adopted because the

egg shape, according to the latest theory, is that of the universe. No corners, all curving, infinity within a confined space, if you follow me."

Heckler: "I don't!"

Spieler: "Take off a little weight, lady, and you'll be in shape to keep up with the rest of us. The ovoid form gives you a feeling of unbounded space yet of security-closeness. When you get inside . . ."

Every house was a great smooth white plastic egg lifted 18.28 meters above the floor of the city by a thick truncated-cone support. (Offscreen commentators explained that 18.28 meters was 20 feet, for the benefit of older viewers who could not adjust to the new system of measurement.) On two sides of the cone were stairs ending at a horizontal door on the lower side of the ovoid. These opened automatically to permit entrance. Also, a door opened in the cone base, and an elevator inside lifted the sick or crippled or, as the spieler put it, "the just plain lazy, everybody's got a guaranteed right to be lazy." The hollow base also housed several electrical carts for transportation around the city.

The President saw Kierson, the Detroit automobile magnate, frown at the carts. The auto industry had shifted entirely from internal combustion motors to electrical and nuclear power ten years, and now Kierson saw the doom of these. The President made a mental note to pacify and reassure him on this point later.

Spieler: ". . . *Variety Within Unity*, folks. You've heard a lot about that on FBC, and these houses are an example. In reply to the lady's anxiety about the houses all looking alike, every home owner can paint the outside of his house to express his individuality. Anything goes. From reproductions of Rembrandt to psychedelic dreams to dirty words, if you got the guts. Everything's free, including speech . . ."

Heckler: "They'll look like a bunch of Easter eggs!"

Spieler: "Lady, Uncle Sam is The Big Easter Bunny!"

The spieler took the group into the house, and the cameramen went into the atrium, kitchen, and the ten rooms to show the viewers just what the citizens-to-be were getting for nothing.

"For nothing!" Senator Kingbrook growled. "The taxpayers are paying through the nose, through every orifice, with their sweat and blood for this!"

The President said, mildly, "They won't have to in the future, as I'll explain."

"You don't have to explain anything to any of us," Kingbrook said. "We all know all about the economy of abundance versus the economy of scarcity. And about your plans for the transitional stage, which you call ORE, *obverse-reverse* economy, but which I call *schizophrenic horrors in tremens*!"

The President smiled and said, "You'll have your say, Senator."

The men and women in the room were silent for a while as they watched the spieler extol the splendors and virtues of the house with its soundproof walls, the atrium with its pool, the workshop with machinery for crafts, the storeroom, the bedroom-studios, TV in every room, *retractable* and inflatable furniture, airconditioning, microfilm library, and so on.

Government shill: "This is fabulous! A hell of a lot better than any noisy rat-ridden dump on the ground!"

Spieler (quoting an FBC slogan): "*Happy and free as the birds in the air!* That's why everybody calls this Bird City and why the citizens are known as freebirds! Everything first class! Everything free!"

Heckler: "Except freedom to live where you want to in the type of house you want!"

Spieler: "Lady, unless you're a

millionaire, you won't be able to get a house on the ground that isn't just like every other house. And then you'd have to worry about it being burned down. Lady, you'd gripe if you was hung with a new rope!"

The group went outside where the spieler pointed out that, though they were three hectometers above ground, they had trees and grass in small parks. If they wanted to fish or boat, they could use the lake in the municipal-building area.

Shill: "Man, this is living!"

Spieler: "The dome above the city looks just like the sky outside. The sun is an electronic reproduction; its progress exactly coincides with that of the real sun. Only, you don't have to worry about it getting too cold or too hot in here or about it raining. We even got birds in here."

Heckler: "What about the robins? Come springtime, how're they going to get inside without a pass?"

Spieler: "Lady, you got a big mouth! Why'n't you . . ."

The President rose from his chair. Kingbrook's face was wrinkled, fissured, and folded with old age. The red of his anger made his features look like hot lava on a volcano slope just after an eruption. His rich rumble pushed against the eardrums of those in the room as if they were in a pressure chamber.

"A brave new concentration camp, gentlemen! Fifty billion dollars worth to house 50,000 people! The great bankruptopolis of the future! I estimate it'll cost one trillion dollars just to enclose this state's population in these glorified chicken runs!"

"Not if ORE is put into effect," the President said. He held up his hand to indicate silence and said, "I'd like to hear Guildman, gentlemen. Then we can have our conferences."

Senator Beaucamp of Mississippi

muttered, "One trillion dollars! That would house, feed, and educate the entire population of my state for twenty years!"

The President signalled to cut off all screens except the FBC channel. The private network commentators were also speaking, but the federal commentator was the important one. His pitch was being imitated—if reluctantly—by the private networks. Enough pressure and threats had been applied to make them wary of going all-out against the President. Although the mass media had been restrained, the speech of private persons had not been repressed. For one thing, the public needed a safety valve. Occasionally, a private speaker was given a chance to express himself on TV and radio. And so, a cavalry charge of invectives had been and was being hurled at the President. He had been denounced as an ultra-reactionary, a degenerate liberal, a Communist, a Fascist, a vulture, a pig, a Puritan, a pervert, a Hitler, etc., and had been hung *in absentia* so many times that an enterprising manufacturer of effigies had made a small fortune—though taxes made it even smaller.

From cavalry to Calvary, he thought. All charges admitted. All charges denied. I am human, and that takes in everything. Even the accusation of fanaticism. I know that what I'm doing is right, or, at least, the only known way. When the Four Horsemen ride, the countercharge cannot be led by a self-doubter.

The voice of the Great Guildman, as he was pleased to be called, throbbed through the room. Chief FBC commentator, bureau executive, Ph.D. in Mass Communications, G-90 rating, one who spoke with authority, whose personal voltage was turned full-on, who could, some said, have talked God into keeping Adam and Eve in the garden.

" . . . cries out! The people, the suffering earth itself, cry out! The air is poisoned! The

water is poisoned! The soil is poisoned! Mankind is poisoned with the excess of his genius for survival! The wide walls of the Earth have become narrowed! Man, swelling like a tumor with uncontrolled growth, kills the body that gave him birth! He is squeezing himself into an insane mold which crushes his life out, crushes all hope for an abundant life, security, peace, quiet, fulfillment, dignity . . ."

The audience, tuning in on forty channels, was well aware of this; he was

Guildman went on about the population expansion, automation, the ever-growing permanently depressed class and its riots and insurrections, the ever-decreasing and ever-overburdened taxpayers with their strikes and riots, the Beverly Hills Massacre, the misery, crime, anger, etc.

painting a picture the oils of which had been squeezed from their own pain. And so Guildman did not tarry overlong at these points. He spoke briefly of the dying economy of scarcity, obsolete in the middle 1900's but seeming vigorous, like a sick man with a fatal disease who keeps going on larger and larger shots of drugs and on placebos. Then he splashed bright colors over the canvas of the future.

The President repressed an impulse to squirm. There would be plenty of blacks and greys in *The Golden World* (the President's own catch-phrase). Utopia could never exist. The structure of human society, in every respect, had a built-in instability, which meant that there would always be a certain amount of suffering and maladjustment. There were always victims of change.

But that could not be helped. And it was a good thing that change was the unchanging characteristic of society. Otherwise, stagnation, rigidity, and loss of hope for improvement would result.

Beaucamp leaned close to the President

and said softly, "Plenty of people have pointed out that the economy of abundance eventually means the death of capitalism. You've never commented on this, but you can't keep silent much longer."

"When I do speak," the President said, "I'll point out that EOA also means the death of socialism and communism. Besides, there's nothing sacred in an economic system, except to those who confuse money with religion. Systems are made for man, not vice versa."

Kingbrook rose from his sofa, his bones cracking, and walked stiffly towards the President.

"You've rammed through this project despite the opposition of the majority of taxpayers! You used methods that were not only unconstitutional, sir! I know for a fact that criminal tactics were used, blackmail and intimidation, sir! But you will go no more on your Caesar's road! This project has beggared our once wealthy nation, and we are not going to build any more of your follies! Your grandiose—and wicked—*Golden World* will be as tarnished as brass, as green as fool's gold, by the time that I am through with you! Don't underestimate me and my colleagues, sir!"

"I know of your plans to impeach me," the President said with a slight smile. "Now, Senators Beaucamp and Kingbrook, and you, Governor Corrigan, would you step into the mayor's apartment? I'd like to have a few words—I hope they're few—with you."

Kingbrook, breathing heavily, said, "My mind is made up, Mr. President. I know what's wrong and what's right for our country. If you have any veiled threats or insidious proposals, make them in public, sir! In this room, before these gentlemen!"

The President looked at the embarrassed faces, the stony, the hostile, the gleeful, and then glanced at his wristwatch. He said, "I

only ask five minutes."

He continued, "I'm not slighting any of you. I intend to talk to all of you in groups selected because of relevant subjects. Three to five minutes apiece will let us complete our business before the post-dedication speeches. Gentlemen!" And he turned and strode through the door.

A few seconds passed, and then the three, stiff-faced, stiff-backed, walked in.

"Sit down or stand as you please," the President said.

There was a silence. Kingbrook lit a cigar and took a chair. Corrigan hesitated and then sat near Kingbrook. Beaucamp remained standing. The President stood before them.

He said, "You've seen the people who toured this city. They're the prospective citizens. What is their outstanding common characteristic?"

Kingbrook snorted and said something under his breath. Beaucamp glared at him and said, "I didn't hear your words, but I know what you said! Mr. President, I intend to speak loudly and clearly about this arrogant discrimination! I had one of my men run the list of accepted citizens through a computer, and he reports that the citizens will be 100 percent Negro! And 7/8ths are welfares!"

"The other eighth are doctors, technicians, teachers, and other professionals," the President said. "All volunteers. There, by the way, goes the argument that no one will work if he doesn't have to. These people will be living in this city and getting no money for their labor. We had to turn down many volunteers because there was no need for them."

"Especially since the government has been using public funds to brainwash us with the Great-Love-and-Service-for-Humanity campaign for twenty years," Kingbrook said.

"I never heard you making any speeches knocking love or service," the President said. "However, there is another motive which caused so many to offer their services. Money may die out, but the desire for prestige won't. The wish for prestige is at least as old as mankind itself and maybe older."

"I can't believe that no whites asked to live here," Beaucamp said.

"The rule was, First apply, first accepted," the President said. "The whole procedure was computer-run, and the application blanks contained no reference to race."

Corrigan said, "You know that computers have been gimmicked or their operators bribed."

The President said, "I am sure that an investigation would uncover nothing crooked."

"The gyps," Corrigan said, then stopped at Beaucamp's glare. "I mean, the guaranteed income people, or welfares as we called them when I was a kid, well, the GIP whites will be screaming discrimination."

"The whites could have volunteered," the President said.

Beaucamp's lip was curled. "Somebody spread the word. Of course, that would have nothing to do with lack of Caucasian applications."

Kingbrook rumbled like a volcano preparing to erupt. He said, "What're we arguing about this for? This . . . Bird City . . . was built over an all-colored section. So why shouldn't its citizens be colored? Let's stick to the point. You want to build more cities just like this, Mr. President, extend them outwards from this until you have one solid megalopolis on stilts extending from Santa Barbara to Long Beach. But you can't build here or in other states without absolutely bankrupting the

country. So you want to get us to back your legislative proposals for your so-called ORE.

That is, split the economy of the nation in half. One half will continue operating just as before; that half will be made up of private-enterprise industries. and of the taxpayers who own or work for these industries. This half will continue to buy and sell and use money as it has always done.

"But the other half will be composed of GIP's, living in cities like this, and the government will take care of their every need. The government will do this by automating the mines, farms, and industries it now owns or plans on obtaining. It will not use money anywhere in its operations, and the entire process of input-output will be a closed circuit. Everybody in ORE will be GIP personnel, even the federal and state government service, except, of course, that the federal legislative and executive branches will maintain their proper jurisdiction."

"That *sounds* great," Corrigan said. "The ultimate result, or so you've *said*, Mr. President, is to relieve the taxpayer of his crushing burden and to give the GIP a position in society in which he will no longer be considered by others as a parasite. It sounds appealing. But there are many of us who aren't fooled by your fine talk."

"I'm not trying to fool anybody," the President said.

Corrigan said, angrily, "It's obvious what the end result will be! When the taxpayer sees the GIP living like a king without turning a hand while he has to work his tail off, he's going to want the same deal. And those who refuse to give up won't have enough money to back their stand because the GIP won't be spending any money. The small businessmen who live off their sales to the GIP will go under. And the larger businesses will, too. Eventually, the businessman and his employees will fold

their fiscal and pecuniary tents and go to live in your everything-free cornucopias!

"So, if we're seduced by your beautiful scheme for a half-and-half economy, we'll take the first step into the quicksand. After that, it'll be too late to back out. Down we go!"

"I'd say, *Up we go*," the President said. "So! It's All-or-None, as far as you're concerned? And you vote for None! Well, gentlemen, over one-half of the nation is saying All because that's the only way to go and they've nothing to lose and everything to gain. If you kill the switchover legislation in Congress, I'll see that the issues are submitted to the people for their yea or nay. But that would take too much time, and time is vital. Time is what I'm buying. Or I should say, trading."

Beaucamp said, "Mister President, you didn't point out the racial composition of this city just to pass the time."

The President began pacing back and forth before them. He said, "The civil rights revolution was born about the same time that you and I, Mr. Beaucamp, were born. Yet, it's still far from achieving its goals. In some aspects, it's regressed. It was tragic that the Negroes began to get the education and political power they needed for advancement just as automation began to bloom. The Negro found that there were only jobs for the professionals and the skilled. The unskilled were shut out. This happened to the untrained white, too, and competition for work between the unskilled white and black became bitter. Bloodily bitter, as the past few years have shown us."

"We know what's been going on, Mr. President," Beaucamp said.

"Yes. Well, it's true, isn't it, that the Negro, as a rule, doesn't particularly care to associate or live with the whites? He just wants the same things the whites have. But at the present rate of progress, it'll take a

hundred years or more before he gets them. In fact, he may never do so if the present economy continues."

Kingbrook rumbled, "The point, Mr. President!"

The President stopped pacing. He looked hard at them and said, "But in an economy of abundance, in this type of city, he—the Negro—will have everything the whites have. He will have a high standard of living, a true democracy, color-free justice. He'll have his own judges, police, legislators. If he doesn't care to, he doesn't ever have to have any personal contact with whites."

Kingbrook's cigar sagged. Beaucamp sucked in his breath. Corrigan jumped up from his chair.

Beaucamp said, "That's ghettoism!"

"Not in the original sense," the President said. "The truth now, Mr. Beaucamp. Don't your people refer to live with their own kind? Where they'll be free of that shadow, that wall, always between white and colored in this country?"

Beaucamp said, "Not to have to put up with honkeys! Excuse the expression, sir. It slipped out. You know we would! But . . ."

"No one will be forbidden to live in any community he chooses. There won't be any discrimination on the federal level. Those in the government, military, or Nature rehabilitation service will have equal opportunity. But, given the choice . . ."

The President turned to Kingbrook and Corrigan. "Publicly, you two have always stood for integration. You would have committed political suicide, otherwise. But I know your private opinions. You have also been strong states-righters. No secret about that. So, when the economy of abundance is in full swing, the states will become self-sufficient. They won't depend on federal funds."

"Because there'll be no dependence on money?" Corrigan said. "Because there'll

be no money? Because money will be as extinct as the dodo?"

The ridges on Kingbrook's face shifted as if they were the gray backs of an elephant herd milling around to catch a strange scent. He said, "I'm not blasphemous. But now I think I know how Christ felt when tempted by Satan."

He stopped, realizing that he had made a Freudian slip.

"And you're not Christ and I'm not Satan," he said hurriedly. "We're just human beings trying to find a mutually agreeable way out of this mess."

Beaucamp said, "We're horse traders. And the horse is the future. A dream. Or a nightmare."

The President looked at his watch and said, "What about it, Mr. Beaucamp?"

"What can I trade? A dream of an end to contempt, dislike, hatred, treachery, oppression. A dream of the shadow gone, the wall down. Now you offer me abundance, dignity, and joy—if my people stay within the plastic walls."

"I don't know what will develop after the walls of the cities have been built," the President said. "But there is nothing evil about self-segregation, if it's not compulsive. It's done all the time by human beings of every color. If it weren't, you wouldn't have social classes, clubs, etc. And if, after our citizens are given the best in housing and food, luxuries, a free lifelong education, a wide spectrum of recreations, everything within reason, if they still go to hell, then we might as well give up on the species."

"A man needs incentive; he needs work." By the sweat of his brow . . ." Kingbrook said.

Kingbrook was too old, the President thought. He was half-stone, and the stone thought stone thoughts and spoke stone words. The President looked out the big

window. Perhaps it had been a mistake to build such a "futuristic" city. It would be difficult enough for the new citizens to adjust. Perhaps the dome of Bird City should have contained buildings resembling those they now lived in. Later, more radical structures could have been introduced.

As it was, the ovoid shape was supposed to give a sense of security, a feeling of return-to-the-womb and also to suggest a rebirth. Just now, they looked like so many space capsules ready to take off into the blue the moment the button was pressed.

But this city, and those that would be added to it, meant a sharp break with the past, and any break always caused some pain.

He turned when someone coughed behind him. Senator Kingbrook was standing, his hand on his chest. The senator was going to make a speech.

The President looked at his watch and shook his head. Kingbrook smiled as if the smile hurt him, and he dropped his hand.

"It's yes, Mr. President. I'll back you all the way. And the impeachment proceedings will be dropped, of course. But . . ."

"I don't want to be rude," the President said. "But you can save your justifications for your constituents."

Beaucamp said, "I say yes. Only . . ."

"No ifs, ands, or buts."

"No. Only . . ."

"And you, Governor Corrigan?" the President said.

Corrigan said, "All of us are going along with you for reasons that shouldn't be considered—from the viewpoint of ideals. But then, who really ever has? I say yes. But . . ."

"No speeches, please," the President said. He smiled slightly. "Unless I make them. Your motives don't really matter, gentlemen, as long as your decisions are for the good of the American public. Which

they are. And for the good of the world, too, because all other nations are going to follow our example. As I said, this means the death of capitalism, but it also means the death of socialism and communism, too."

He looked at his watch again. "I thank you, gentlemen."

They looked as if they would like to continue talking, but they left. There was a delay of a few seconds before the next group entered.

He felt weary, even though he knew that he would win out. The years ahead would be times of trouble, of crises, of pain and agony, of successes and failures. At least, mankind would no longer be drifting towards anarchy. Man would be deliberately shaping—reshaping—his society, turning topsyturvy an ancient and obsolete economy, good enough in its time but no longer applicable. At the same time, he would be tearing down the old cities and restoring Nature to something of its pristine condition, healing savage wounds inflicted by senseless selfish men in the past, cleansing the air, the poisoned rivers and lakes, growing new forests, permitting the wild creatures to flourish in their redeemed land. Man, the greedy savage child, had stripped the earth, killed the wild, fouled his own nest.

His anger, he suddenly realized, had been to divert him from that other feeling. Somehow, he had betrayed an ideal. He could not define the betrayal, because he knew that he was doing what had to be done and that that way was the only way. But he, and Kingbrook, Corrigan, and Beaucamp, had also felt this. He had seen it on their faces, like ectoplasm escaping the grasp of their minds.

A man had to be realistic. To gain one thing, you had to give up another. Life—the universe—was give and take, input and output, energy surrendered to conquer

(CONTINUED ON PAGE 107)

Christopher Anvil's space-ship stories include his "Trial by Silk" in our March issue, but this one is one of a particular series, and a sequel to his "Bill for Delivery," presently in print in the Ace edition of World's Best Science-Fiction: 1965. Another letter from Al to Sam, it details exactly how one copes with a runaway intellect, if one is forced to take—

THE LOW ROAD

CHRISTOPHER ANVIL

Illustrated by DAN ADKINS

DEAR SAM:

I'm not sure what order my letters have been reaching you in, but this one comes after we had that mess with the banjo-birds, finally got them delivered, and then the Old Man renamed our ship *The Champ*. I got promoted to captain, Hook got promoted to first officer, and so on. As you remember, the Old Man then sent us out to get a cargo of the things these banjo-birds *eat*.

Let me tell you, Sam, when we started that trip, we were really sitting on top of the universe. We had our accumulated back pay, our new stripes, the Old Man's praise, and our ship had a new name. In a transport outfit where the boss names the ships according to their performance, and where *Spittoon* is not the worst name, you can see how it would be to be captain of *The Champ*.

As for our cargo, that didn't worry us too much. After all, we'd lived through the banjo-birds with their needle-pointed two-foot beaks and vicious dispositions. We ought to be able to handle the web-

scorpions, *slints*, *greevils*, *night-robbers*, and so on, that the banjo-birds lived on.

Well, Sam, what we overlooked was that the banjo-birds were *specialists* in *slints* and *greevils*, and we weren't.

I know, you haven't had any letter from me about that trip. I just haven't been able to bring myself to talk about it. You can get some idea when I tell you we no sooner limped back into the loading center, when out came a crew to paint out *The Champ*, and put a new name on the ship. We were too beat up to care much, but we figured we'd got off easy when we found out the new name was *Bunglers All*.

What we didn't know was that the Old Man had just got started. Next came an order demoting the lot of us. Instead of being captain, I was now first officer. Hook Fuller went down to second officer, Pete Snyder to third officer, and so on. Pretty soon, we got our pay, and another jolt. The demotions were *back-dated*. Next came word that we were fined for various offenses, and out of our cut pay we had to hand over good-sized chunks for the fines.

Believe me, there wasn't much left of us when the dust settled.

I know, you might wonder—couldn't we have fought it? In the shape we were in, we couldn't have fought our way out of a paper sack. And we would have run head-on into the Old Man's standard reasoning: "You do the job, and you get the pay. Don't do the job, and you get the axe." The Old Man judges strictly by results.

There *are* outfits where, if you come back a hundred eighty days late, doped to the eyeballs on bootleg hopweed and awash in home brew, with the cargo lost or forgotten, and then after you're back you shoot up the front office just for fun, why, the corporation will send a lot of headshrinkers out to dig up the 'deep underlying causes,' and vice-presidents will moan and wring their hands because somehow *they've* failed *you*. But, as I say, that isn't how our outfit works.

Well, when everything settled down, we were still alive, and we hadn't been fired, and we were starting to think some day we'd get over it, when we got word the new captain was on his way out in a taxi-boat. That really heaped the coals of fire on us. Changing captains is bad enough. But to be demoted, and have a new man put in over you—Let me tell you, Sam, that takes some getting used to.

Hook, now back to second officer, said gloomily, "I wonder what boob they're sticking on us?"

Pete Snyder groaned. "Sure as anything, we'll get one of the ramrods."

That made sense. What Pete meant by "ramrods" was the pair of ex-Space-Force Officers the Old Man uses to straighten out the worst ships and crews. One of the ramrods stands about six foot ten and likes to travel on half-gravity, because the deck bending underfoot irritates him. The other isn't as tall, and he's as spare as a colonist's



horsewhip. But regardless of their appearance, one is about as bad as the other. They're both solid poison.

"Ace" Barty, his voice dull, said, "I wonder which one we'll get, Upper Jaw or Lower Jaw?"

They got those nicknames when the Old Man bounced the captain and first officer of *Worst Yet*, and put *both* ramrods in, the bigger one for captain, the other for first officer. *Worse Yet* had a crew that thought it was tougher than any combination of officers—but that was before they shipped out on that trip.

You know, Sam, when something's only half-bad, a man's eager to talk about it. When it's *real* bad, you have to wait and let it come out, a sliver at a time.

You can take one of the tough crewmen who shipped out on *Worst Yet*, with Upper Jaw for captain and Lower Jaw for first officer, and go to the most wide-open joint in the easiest-run space center you can find, and pour double shots of super-nova down his throat as long as the place stays open; about 0200, he'll stare into his empty glass and growl, "The bastards." That's it, Sam. That's all he'll say about it.

Pete Snyder must have been thinking about the same thing, because he said, "Just be thankful it isn't *both* of them."

Ace said bitterly, "Whichever it is, we can make it plenty tough for him."

Hook gave Ace a flat look. "You say anything to him but 'Yes, sir,' and I'll brain you myself."

Ace muttered, "We got to stick together."

"Are you nuts?"

I said, "Anything we might think up, he's already had happen to him. We'd better just endure it."

Ace said grudgingly, "Yes, sir," which was his indirect way of telling me he still regarded *me* as captain. This was one of the

first things either Upper Jaw or Lower Jaw would spot, and naturally Ace and I would *both* get flattened for it.

All told, this was shaping up to be an unforgettable experience. I was mentally groping for some way out when a crewman called, "Taxi-boat at the main hatch!"

Hook glanced at me. "Now what?"

"Both of us had better meet him. Whichever one it is."

We trudged down to the airlock, and matched lock pressures with the taxi-boat. I don't know what Hook was thinking, but I was wishing I could do as our previous captain had done when this banjo-bird business first started, and just retire off the ship onto a convenient colony world, and have done with the mess. But that was a daydream. There was nothing to do but face up to Upper Jaw or Lower Jaw, whichever one came through.

We swung the hatch back, and stood paralyzed as a big white-haired man looked us over, beamed, stepped in carrying a space bag, said, "Come to my cabin when you get done here," and walked out of sight.

That was our *former* captain. —The one who had *retired*.

Well, we closed the hatch, made sure the taxi-boat cast itself loose and started back to its cove, and then we headed for the captain's cabin. On the way, we ran into Ace and Pete, staring as if they'd seen a ghost.

We knocked, and a familiar gruff voice called, "Come in."

The captain was lying back on his bunk, hands clasped behind his head, smiling.

"Boys," he said, "never retire onto a new planet that has winters like *that* one."

"You *hired* on again?"

"Which would you choose, forty-foot snow drifts and a fifty-mile wind, or this cabin? Believe me, boys, space is *soft*. I got out of that place on the first supply ship this

spring, got in touch with the Old Man, and he said, 'Sure, come on back. When I got here, he was cursing about 'flying slints.' He didn't get into a good mood till I described the time on that planet when I got stuck in the cabin for four days with only one day's wood, and the snow-wolves padding over the roof trying to pry up the shakes. Let me tell you, boys, this ship is the finest sight I've seen for a long time.'

Hook looked dazed, then grinned. What a relief to have our regular captain back! Just then, a crewman brought word that a cargo section was ready, and we were to deliver it to Tarmag II. That was short notice, but nobody complained. We loaded up on supplies, got the cargo section hooked in tight, and started for Tarmag.

Well, Sam, believe it or not, we had no trouble on the trip to Tarmag, and we got there well ahead of schedule. Tarmag II turned out to be a planet that was about 99.9% wild. The other 0.1% or so had been settled by a bunch of one-track-minded superspecialists. As near as we could figure it out, there wasn't a real all-around colonist among them. They'd tried to settle on the mainland first, but it hadn't taken long to find out the planet was going to wipe them out, so they tried an island off the coast, blasted it clean of vegetation and wildlife, and practically made it over. Whenever they needed a source of raw materials on the mainland, they burned away the vegetation, put up a wall, sank their shaft or dug their pit, and so far as possible blocked out the rest of the planet. They've got it set up so they transport by air, or in coastwise robot barges, live in a few modest-sized cities, and as much as possible spend their time in the laboratories.

Think of it, Sam. Here's a planet that's earth-type, with luxuriant vegetation, all kinds of animals, room enough for everyone, and what do these colonists do?

They turn their backs on all that, and settle in for a lifetime of *research*.

Now, that's unusual, but believe me, there's more to it. While we were down on that planet—in the city they call Lab I—what do you suppose *we* thought about?

Before we started down, Ace was saying, "I wonder what kind of girls they got in this place?"

Once we were down there, Ace started saying, "You know, Al, these guys have got something. I mean, research, is the thing. You *learn* something. You *get* somewhere. Otherwise, what's life add up to? You're born, grow up, fight, grab your share, have kids, die, and the kids grow up, fight, grab their share, have kids, die, their kids grow up, fight, grab their share, have kids—what's the *point*?"

Did this tough crew of ours spend their precious leave-time whistling at the girl research-workers, or smuggling out bootleg 200-proof absolute alcohol?

No. They burrowed into libraries, and took special tours of the research facilities. We had to *drag* them out.

"Whew," said Hook, when we started back up in the tender, "it hurts to leave an opportunity like *that* behind."

Ace nodded. "I haven't hardly cracked a book since I got my papers. But down in that library, I could see, for the first time—oh, a lot of things. Like just how fascinating an equation really is. There's a beauty there that—"

Pete Snyder interrupted. "The *best* way to learn is in the Simumodel. Take the body, for instance. You can drift right down into the muscles, follow the nerves, see the blood go rushing by—not *really* see it, of course but you *seem* to see it, and—"

"The thing is," said Ace, "you get the *integral* so what do you do then? You've got the original integrand in the integral. *Now* where are you? Well—"

"This is all kid stuff," said Hook. "Integrals. Muscles. Listen, Al and me—"

There was a kind of funny change in the atmosphere, and then one-by-one we started looking at each other blankly.

Just how the others felt, I didn't know. But suddenly I couldn't care less about the libraries and the Simumodels.

"Now," said Hook, scowling, "what was that?"

"Drop back down," I said. "That's the first time I ever ran into a thing like that."

We went down about five hundred feet, and, somewhere during the descent, Ace said, "That's funny. For an instant there, I thought I'd gone nuts. You transpose, then you've got—"

Now, again, libraries and simumodels meant something.

Hook scowled, and started the tender up again.

There was that funny change in the atmosphere.

Ace looked around blankly.

"Down slow," I said.

We eased down, and I could tell from the fascinated expression on Ace's face that he was again thinking about his equations.

Hook said, "That's roughly it, Al. Above that level, liquor and women. Below that level, calculus and anatomy."

As we went up, Pete said dazedly, "We were sabotaged!"

Groping for the explanation, we got up to the ship—somehow I can't bring myself to call it by name—and found the captain and the cargo-control officer had finished checking the cargo.

"Damned queer cargo," growled the captain.

The cargo-control officer, a man by the name of Fisher, was studying a thick sheaf of papers, and murmured, "Maybe none of this will happen."

"Maybe. But the sooner we get this load

to cut-loose, the better."

Hook and I glanced at each other. So far as we knew, the cargo was just some electronics equipment in crushproof boxes. What was wrong with that?

The captain went off, plainly thinking hard, toward the control room, and Hook and I wasted no time cornering Fisher, the cargo-control man.

"Say, Fish," said Hook. "What's the matter with this load? I can see the *planet's* peculiar enough. But what's wrong with the cargo?"

Fisher held out a thick sheaf of papers marked:

WARNING!

Read Carefully

Instructions for Shippers, INSTIM Mark IV.

"INSTIM," said Hook. "What's that?"

"That," said Fisher, "is the thing we're shipping. While you guys were down there taking it easy, the automatic loaders were stacking them in by the thousands."

"Yeah, but what is it?" said Hook.

"That," said Fisher angrily, "is something I would hate to make any bets on. Remember, we're just the *shippers*. But if you'll leaf through that wad of instructions, you'll see why I'd rather we'd hooked onto a tank with a couple hundred feet of *kangbar* inside."

Well, that didn't sound good. But it looked worse when we got the thick sheaf of instructions opened up, and started looking through it:

"... extreme caution at all times to avoid undue jarring of the units . . .

"... accidental activation of any given unit is extremely unlikely; but when shipped in large consignments the possibility becomes a definite consideration,

and due care must be exercised . . .
" . . . mutual interaction of the units.
This triggering-and-reset characteristic is important in transporting large numbers of units . . .

" . . . similar to a chain reaction . . .

" . . . what happens in extreme cases is not known, as no survivors have yet returned . . .

" . . . any unusual pattern of thought on the part of one or more of the crew members is a warning signal . . ."

Hook and I looked at each other.

Fisher said, "You see what I mean?"

"We're starting to."

Pretty soon we hit the following:

" . . . If, for instance, a crew member, who normally dislikes nucleonics, finds himself unexpectedly wishing to study nucleonics, this may be classified as a Tentative Warning Symptom (TWS). If, in addition, other crew members now find themselves wishing to study nucleonics, again for no known reason, then this mass-interest may be classified as a Definitive Warning Symptom (DWS). If, then, *all* crew members find themselves earnestly wishing to study nucleonics, this phase may be classified as an Urgent Warning Symptom (UWS). Any otherwise unexplainable increment in the desire to study nucleonics presupposes the activation of more units. The usual progression from TWS to DWS to UWS is not reversible except in the initial phases, as the activation of additional units is cumulative, selective, and mutually reinforcing, and presumably eventuates in mass-activation of all units. The subjective nature of such an experience is as yet unknown, but, objectively, it is presumed to be fatal . . ."

" 'Objectively,' " growled Hook, " 'it is *presumed to be fatal*.' "

Fisher said, "That's the part that counts, all right. There's also something in there

about how, in large consignments, the possibility becomes a definite probability. This is a large consignment we've got."

"What do we do," I said, "if it *does* happen? Is that in the instructions?"

Fisher thumbed through the papers, to read:

"In the event of a TWS, locate and manually reset any triggered unit to zero immediately. This will negate the possibility of accidental activations leading to a DWS and the consequent necessity of resetting large numbers of units, with the accompanying risk that the units will set each other more rapidly than they can be neutralized."

The instructions then moved on to a discussion of how to handle the sensitive units.

"Hold on," said Hook. "There's a little item they left out."

"Where," I said, "does it tell us *how to locate* the unit that's making the trouble?"

Fisher smiled sourly. "It doesn't bother with that. But it does tell us—let's see—here we are: 'Deactivation of the activated units will be signaled by cessation of the anomalous mental response.' "

"So you know when you've found the activated units because then you won't want to study nucleonics, for instance?"

"Correct."

"But the instructions don't tell you *how* to find the activated units?"

"Nope."

"And just how many units are there?"

"Well, let's see. To begin with, twelve dozen units, each unit packed inside its own protective covers, fit into a special carton about two feet wide by a foot-and-a-half high by three feet long. These cartons are stacked up and packed in shock grids. The shock grids are racked, and all but fill the cargo section. You want to take a look?"

Hook and I glanced at each other.

"Lead the way."

Fisher headed down the corridor to the connecting door, shoved it open, and we followed him into the cargo section.

As far as the eye could reach, cartons a foot-and-a-half by two feet on the end were stacked up in shock grids—open frames with specially designed coil springs and dampers—each grid holding what looked like about thirty-two cartons. The grids locked into stacking racks, and the whole works filled up the cargo-section, leaving just room enough for horizontal and vertical access spaces.

"Just suppose," I said, "that you knew which one of those units was making the trouble? How long would it take to get it out?"

"Well," said Fisher, squinting at the frames, "first we'd have to pull out the right grid. That could take us ten hours, depending on where the grid's located. Then we'd have to disassemble the grid. With the special equipment they use at terminals, that would take about two seconds. But we don't have that special equipment, so we'd be lucky if we got it done in an hour. Then we'd have to separate the cartons, and they're bound together with interlocked Crushflex strips. Say ten minutes to get through that and get out the right carton. Next you have to get into the carton. Each carton has twelve dozen units in it. Each of these units has two protective covers. Well, to be optimistic about it, it would take us maybe twelve hours to get at the right unit, *assuming* we knew just where it was to start with."

We stood there thinking that over.

Fisher added. "But if these instructions tell how to locate the activated unit, *I* haven't been able to find it."

"But even if we could, we couldn't reset it immediately."

"Nope."

Hook swore. "Another disaster-cargo."

"It *might* be all right," I said, trying to generate a little hope. "There are only two jumps between here and cut-loose."

"Yeah, but that second run is a long one. We better think of something to do pretty fast, because you know what kind of luck we had the last trip."

Just then, the captain swung us out from Tarmag II. We were on our way.

For the first few days, everything seemed fine. We made our first jump, and then we were into that long second leg of the trip. Still there was no trouble. If anything, everybody was more normal than usual. I think this was because we were all afraid *not* to be normal. If anyone had an unusual thought, he kept it strictly to himself.

Every time we had a chance, we got together, to try to figure out what to do if trouble started. It was the captain who got the first idea.

"Boys," he said, squinting at the contract, "it doesn't say anything here about our delivering these things *unactivated*."

Hook scowled, "Still, if we don't want the first unit to activate another one, and those two to activate more, we've got to locate that first unit."

"Yes, but the important thing is, the contract *does not so state*. That gives us a choice. Either we locate any activated unit, or we find some way to live with it."

"It," I said, "and the thousands of others it will turn on."

The captain nodded, and glanced at Fisher. "Do those instructions make any mention of anything that shields out the effect?"

"Not a thing."

Hook said, "Wait a minute. *Distance*, at least, shields it out." We told the captain what had happened to us down on Tarmag II, and on our way up from the planet, and

he quizzed us on it.

"That sounds," he said finally, "as if it's got a definite limit. If we have to, we could treat this as a normal-space haul of explosive cargo, and let it out on the long-reach extension cable."

"If," said Hook, "it waits till after our next jump to act up."

The captain nodded. "Otherwise, we'll have to reel the cargo section in to make the jump, and that will bring us in range of all those units. Well, possibly by the time this thing starts to make trouble, we'll—"

Ace said, his voice somewhat feverish, "We could *probably* work it out by integral calculus."

There was a silence, as everyone turned to take a good look at Ace.

Ace's eyes were shining. He had that fascinated look we'd seen before.

"Let's see," he said, "The cross-section is probably a circle, but it *could* be an ellipse, or even—where's some paper? Boy, integration is the most wonderful—"

We glanced from Ace to the captain, who said, "Lay him out. There could be a feedback between him and the cargo."

Hook and I both laid him out, and Pete Snyder did the same thing at the same time, so poor Ace didn't get much integration done, and if he hadn't been pretty tough, we'd probably have killed him.

"Okay," said the captain, "Connect the long-reach and let that cargo-section out all the way. Make sure the cable sensor is linked up with the drive-control. I'll get some men suited up and outside to help you."

We started aft, but halfway there Hook stopped and backed up.

Beads of perspiration stood out on his forehead.

Pete Snyder clenched his fist, "What's wrong, old buddy?"

"Before I stepped back, for just a second,

I started thinking about calculus."

"Hold it!" I said, before Pete could do anything. "Listen, Hook, can you fight it off and help us with the long-reach?"

"I can try." He took a step forward, then stepped back. "I wouldn't be any use to you."

"Put a mark on that bulkhead, go back and send somebody to help us, then try it with a suit on, and see if you get any further."

Hook took out a marking pencil, drew two vertical lines on the bulkhead, and sprinted back down the corridor. Pete and I went on to the cargo door.

Well, Sam, we didn't have any trouble hooking the cargo section on the long-reach, and we made sure the cable sensor was connected to the drive-control, so any overstrain would cut the drive. We got *that* part done all right.

The trouble was that as the weight came on the long-reach and helper cables, and as the drive cut back thrust to ease the strain, and as Pete called, "Drive-g into the orange! Low tone from the sensor box!" and as I said into the microphone, "Ease off *slow* all helper cables—slow, now, *slow!*" and as the men let the helpers out further and the full strain came on the long-reach, and the sensor-box audible-warning climbed up to a wail and slid down as the drive cut back further—as these things happened and the ship pulled gradually ahead of the cargo-section, it occurred to me that Ace was right. When you integrate $e^{-\sin x} dx$ and get minus $e^{-\sin x} dx$ in the answer, that is beautiful. It's so neat, so—

Pete, for an instant, stopped calling out the distance in yards, then resumed with a note of strain in his voice, and then the overpowering desire to work integrations was gone, and after a while Pete called out, "Full length on the long-reach! Standby tone from the sensor box!"

I locked up the emergency disconnect, and got everyone back inside. Letting the cargo section out on the long cable can turn into a tricky operation, but that didn't account for the men's pale nervous look as they got out of their suits.

Pete and I checked to make sure the helper cables were in place, and that there were no leaks around the ship's cargo-section space-door. Everything seemed okay, so we went forward and reported to the captain.

The captain studied our faces.

"Boys," he said, "from the way you look, you're leaving out something."

" $e \sin x dx$," I said.

"It hit you, too?"

"For maybe ten seconds."

"How far out was the cable?"

Pete said, "Maybe a fifth of the way."

I said, "This 'activation of new units' is cumulative, isn't it?"

The captain glanced at the Instructions for Shippers, and quoted: "... cumulative, selective, and mutually reinforcing, and presumably eventuates in mass-activation of all units."

Pete said hesitantly, "Sir, maybe we could abandon the cargo under Section XIV—'Cargo imminent hazard to life and limb.'"

The captain didn't hother to answer. The Old Man doesn't recognize Section XIV.

Pete said insistently, "If not, we've still got to make this next subspace jump between us and cut-loose. With this rig, we've got to get that cargo-section in close."

"Then we'll do it," said the captain.

"Yeah, but—"

The captain reached around and took down an expensive-looking blue-and-gold miniaturized book box lettered "Library of Universal Knowledge, 1062 Volumes." He carefully folded out the viewing lenses, pressed a set of little buttons, and handed it

to me. "Read this aloud."

A sizeable book seemed to open up as I glanced into the lenses, to read: "Thought Intensifier— A device capable of selectively intensifying intellectual activity in those exposed to its action.

"The thought intensifier, or intellectual stimulator, is a hypothetical device, presently outlawed on several planets, which is believed capable of stimulating known human intellectual interests of many kinds, and maintaining them for long periods, even, with consequent uneasiness, when the intellectual activity runs counter to the exposed individual's natural tendencies. The device cannot, of course, stimulate mental activity that the target is incapable of. A rock, insect, or a man unconscious or in a stupor, is a poor subject for mental stimulation. The device is said to operate by precise activation of selected nerve-tracts or patterns, and obviously such tracts can be affected only if they exist. However, provided nerve-tracts are capable of functioning, this device is said to be capable of activating them.

"While theoretically considered to be potentially useful, in proper hands, and while a large and authoritative body of opinion holds that such devices, if they exist, could and should be used openly to stimulate desirable forms of mental activity, it has also been strongly urged that intellectual stimulators are essentially immoral, and restrict a fundamental 'freedom of thought' (see FREEDOMS, Varieties of).

"Whatever the reality or unreality of these views, the use of thought intensifiers, if it has actually taken place, has been accompanied by such secrecy and indirection that the existence of the devices remains problematical.

"Other names sometimes used in referring to these devices include: 'thought

stimulator,' 'thought simulator', and 'INSTIM', the latter a supposed *trade-name* for a particularly unstable type of intellectual stimulator (see SPACEWRECKS, Famous) reputed to be of small size, high power, and great sensitivity to shock with resulting random activation.

"Authoritative opinion currently holds that such devices, in the present state of the art, are impossible, and that persistent rumors concerning their use are only examples of folklore-in-the-making (see FOLKLORE, Recent, SPACE SAUCERS, and MYTHS and RUMORS)."

I handed the box back to the captain, and Pete said doggedly, "How does that help us? We've got to hook the cargo section in close to make the jump, and when we do, there will probably be enough of those units activated so the whole ship will be in range. There won't be a thing we can do except calculus. Food won't interest us. Maintenance won't interest us. We'll work calculus till we drop." He looked around, as if to see from our expressions whether maybe *he* was nuts; but, believe me, we agreed with him. I never heard of anyone dying of math before, but that didn't help us. Either we found some way to get that cargo to cut-loose without being mentally swamped by it—or it would kill us.

Pete looked worriedly at the captain.

I've seen the captain bothered more by a comma in a contract.

"Well," he said, "we don't know how fast the range of those units is extending. The first thing to do is send a man on a line back along that long-reach, and meanwhile rig the spider lines. We may have to let this cargo section out further."

That made sense, but it was another headache. With the long-reach, we had *some* acceleration. The spider lines are strong for their thickness, all right. But whatever the stuff is they're made of, it's

not only strong, it's *elastic*. Under tension, the thin shiny strands dwindle down so you can only see the reflection of an angled light on them. They don't hang in a true line, once the waves of expansion and contraction start traveling up and down them, and any particular line can loop around maddeningly. The only way to get them to hang right is to put them under heavy tension, and then, without warning, they *stretch*. You can get in quite a mess with these lines, but we had no choice. Hook, easing back along the long-reach, had discovered that the field of the units was working forward in jumps that would probably put the whole ship deep inside the field sometime tomorrow.

The obvious alternative was to find a way to shield out the effect.

Using metal stocks from the storeroom, and everything else we could think of, we still found nothing that shielded out or modified the field.

To be on the safe side, we had no choice but to rig the spider lines to the long-reach, and ease further ahead of the cargo section. We had to cut our acceleration, and that lengthened the delay to the jump-point, which allowed more time for more things to go wrong.

The captain, meanwhile, stayed calm and cheerful. He even gave orders for the cook to brew up a batch of his special-formula potjack, to celebrate when we hit the jump-point. It seemed a funny time to have a celebration, but we didn't have time to think about that. We were too busy trying to work out some kind of protective cage of current-carrying wires. The idea was that the variations in the electromagnetic field might disrupt the field generated by the INSTIM units. It sounded good, but nothing we were able to send through the wires worked.

Meanwhile, the INSTIM field was

creeping out. By sending the tender through it on remote control, with a volunteer inside, we were able to plot the edge of the field and estimate its strength. We discovered it was now roughly spherical, and so strong that, once in it, a man had no slightest choice what to do. He thought, worked, and lived calculus, and that was all. We were in no danger from this, *yet*, but if we reeled that cargo section close to the ship to make the jump, the whole ship would be deep inside it.

The only hope seemed to be to work out some kind of automatic device to reel in the cargo section before the jump, and let it out again afterward. We might have worked this, if it hadn't been for the spider lines. No matter what we did, we couldn't figure any way to make the handling of those lines fully automatic.

Hook and I took it up with the captain.

"Sir," I said, "I don't like to say it, but it seems to me this is one cargo we *have* to dump."

The captain sat back and looked at us, benevolent and unconvinced.

I said, "We can't shield out the effect. We can't moderate it. We can't vary it at all. This model cargo section has to be hooked in tight when we make that jump. At the jump-point, then, we've got to work inside of the field. But we *can't* work inside the field. All we can do inside of it is what it dictates."

The captain clasped his hands behind his neck.

"We haven't hit this problem a good low blow yet. We've only tried to solve it on a high level."

Hook said grimly, "I'll hit it as low as I can hit it. But *how*?"

The captain took down his little book box, and read aloud, "... The device cannot, of course, stimulate mental activity that the target is incapable of. A rock, insect, or a

man unconscious or in a stupor is a poor subject for mental stimulation . . ."

He then looked at us.

Hook smote his forehead and swore.

I stood there too dazed to speak.

"There are generally two ways," said the captain, "to take care of a problem. One is to solve it on its own terms, satisfy its requirements. That, you might say, is the *high road* to a solution. The other way is to unhinge the problem—rearrange matters so it doesn't *have* to be solved. That, you might say, is the *low road*. Either way, you take care of the problem.

"Say your girl springs it on you that to prove you love her you've got to go out and bring back the head of a wild *kangbar* you've killed, all by yourself, just for her. The high-road solution of that problem is to go out, find and somehow kill the monster single-handed, and freight back the head.

"The low-road solution is to get her to change her mind, or else find a different girl. That doesn't solve the problem on its own terms. But it takes care of it, all right.

"Now, this cargo of activated INSTIM units puts us in a spot where, to deliver the cargo, we've got to work inside the field generated by the units. But the units are so set that no-one with the *capacity* to be interested in moderately advanced mathematics can help but be interested in mathematics—to the degree that he can't think of anything else. The field therefore presents us with the problem of somehow finding a technological means to shield out the effect, so that we can work inside the field. This solution is the *high road*. But that doesn't mean it's the *only road*."

The captain reached into his desk drawer, and set on the desk a small neatly-stoppered jug.

"I hoped," he said, "that we *could* figure out a way to shield out the effect. It might be a handy thing to know. But, since we

(CONTINUED ON PAGE 107)

AMAZING STORIES

Every writer has his dry spells, those "writer's slumps" when he can stare day-long at his typewriter and produce not a single word. But some science fiction writers have a tougher problem . . .

DRY SPELL

BILL PRONZINI

THE BANE of all writers, John Kensington thought glumly, *whether they be poor and struggling or whether they be rich and famous, is the protracted dry spell.*

He sat staring at the blank sheet of yellow foolscap in his typewriter. His mind was as blank as that paper. Not a single idea, not a single line of writing that even remotely reached coherency in almost three weeks.

Sighing, Kensington pushed back his chair and got on his feet. He went to the small refrigerator in the kitchenette, opened his last can of beer, and took it to the old Morris chair that reposed near his desk.

I've got to come up with something, he thought. The rent's due in another week, and if I don't get something down on that grocery bill I can forget about eating for awhile.

He sipped his beer, closing his eyes. *Come on, son, he thought. Just an idea, just one little idea . . .*

He let his mind wander. It seemed, however, to be wandering in circles. Nothing. Not even . . .

Wait a minute.

Now wait just a single damned minute here.

The germ of something touched a remote corner of his brain. It was a mere fragment, evanescent, but he seized it the way a man dying of thirst would seize a dipper of

water.

Grimly, he hung on. The fragment remained. Slowly, inexorably, it began to blossom.

Kensington sat bolt upright in the chair, his eyes wide open now, the beer forgotten. His fingertips tingled with excitement. The coming of the idea was a catharsis, releasing the tension which had been building within him for the past three weeks.

It would be a science fiction/fantasy story, he thought, probably a novella if he worked it properly. He moistened his lips. *Now, let's see . . .*

Suppose there's this race of aliens plotting to take over Earth, because it is a strategic planet in some kind of inter-galactic war they're involved in. Okay, okay, so it's hackneyed. There are ways to get around that, ways to play that aspect down.

These aliens have infiltrated Earth and set up some kind of base of operations, maybe up in the mountains somewhere. They're assembling a kind of penultimate cybernetic machine which, when fully completed, will have the power to erase all rational thought from the minds of humans, turning them into obsequious zombies. Wait now. Suppose these aliens have a portion of this machine already completed. This portion would be capable of reading, simultaneously, the thoughts of every human on Earth, and of categorizing those

(CONTINUED ON PAGE 135)

They found themselves on a world which resembled Earth in the distant past. Was it Earth? And if it was indeed Earth, how could they explain the presence of a race of intelligent birds? How could they account for—

ORN

PIERS ANTHONY

Illustrated by MICHAEL WM. KALUTA
Second of Two Parts

SYNOPSIS

The Earth authorities had moved fast. Once convinced the mantas of Nacre—sentient fungoid entities—were a potential menace to the ecology of Earth, they had instituted a massive pogrom aimed at containing and capturing the seven who remained (Pent had been killed by the agent Subble before his own death) along with the three humans who had brought them to Earth, VEG, CAL and AQUILON. As Piers Anthony's first novel in this series, *Omnivore*, concluded the seven mantas and three humans were launched into orbit in a space capsule, to prepare for decontamination and deportation back to Nacre.

They were not to make that journey. Instead, as they docked with the space station, they were told that they were being sent via an experimental displacer into another continuum, to a new, unexplored world.

VEG christens the world Paleo, and for good reasons: it appears to be a virtual duplicate of Earth itself in the paleocene

period, a time when the continents had not yet drifted far apart and the mammals were only beginning to take over the ecological roles of the reptiles.

For reasons unknown to the three, three of the mantas had launched an apparently suicidal attack on station personnel, only four of them crossing over into Paleo with the humans. The remaining four are HEX, VEG's favorite; CIRCE, who is closest to AQUILON; and DIAM and STAR. Together, the seven set out to explore the virgin world of Paleo.

They first set up camp on an island some hundreds of miles off the west coast of what might someday be California. But when the mantas bring warning of a tsunami—a "tidal wave" caused by earthquake activity—they desert the island on a large raft VEG has built, hoping to ride out the wave on the open sea where it will be more gentle. This they do, and then sail for some days eastward until they make landfall on the continent itself. By this time CAL is convinced—and has told VEG and AQUILON—that Paleo is not simply an alternate Earth, but Earth itself. Somehow

time travel has been discovered, and they have the opportunity to map the planet of their own distant past!

But if it is indeed Earth of the paleocene, it is not entirely as scientists had come to regard it. For one of its inhabitants is ORN, a man-sized and sentient bird.

ORN is a walker—not a flier or a swimmer—and he is omnivorous. More important, he is blessed with a racial memory which extends back through the entire path of evolution to the single-celled creatures of the ocean soup of life. Those memories which precede the evolution of his own species, however, fade soon after hatching, leaving him with detailed memories of the landscape, flora and fauna explored by and known to his actual ancestors over the past several million years.

In this fashion ORN can draw upon the accumulated knowledge and wisdom of his ancestors; indeed, it is easier for him to cope with common problems faced many times by those who came before him than with new and unusual problems.

Yet he is better fitted for survival among the unknown than most of his race. Orphaned just as he was about to hatch, he had had to cope with life on his own without the comforting instruction of his parents, both of whom were killed protecting the nest from an errant rep. From birth, ORN has had to learn to cope on his own, and he has done so quite successfully. The only bird of his type on the island of his birth—his species is apparently dying out—he has learned to feed himself and take care of himself and even to escape, half-grown, the sudden volcanic destruction of his island, venturing onto the mainland in a year-long trek of exploration.

On the mainland he finds evolution has not been idle. Since his particular ancestral line had settled on the island the mammals—or "mams"—have grown to



new and dangerous sizes. At first he is unprepared to deal with the sudden onslaught of a predator mam, but by visualizing it as its rep'equivalent he finds himself able to deal with it. And thus he learns a lesson that takes him closer to genuine innovative thought.

His island had been warm even in winter, due to its volcanic activity, but the mainland is not. Driven south, he makes a dangerous crossing through high mountains of volcanic origin beyond which none of his ancestors ever penetrated. This fadeout of his mental map is a significant warning, but he has no choice but to press on. Ultimately he descends into a valley warmed by surrounding volcanic ranges and finds a pocket of the familiar: evolution has not reached quite so quickly into this restricted clime; the great reps and old dangers of his familiar ancestral memories are still here.

And here also he finds at last the elusive spoor for which he has been unknowingly questing: the spoor of a female of his own species! Hormones are awakened and new memories emerge. At last he understands what it is he has been searching for.

And here also the path of the three humans and four mantas converge. Following the coast southward to escape winter even as ORN has, they come upon the valley by sea instead of overland. And here, grazing along the coastal swamp, they discover a full-grown *Brachiosaurus*, the largest dinosaur of all time, a fifty-ton monster. The valley—in an extension of the continent which has no analogue to modern Earth—is a Cretaceous enclave.

Believing the *Brachiosaurus* relatively harmless—it is a herbivore, not a meat-eater—they skirt it too closely, the keel of their raft colliding with its submerged tail. The huge dinosaur reacts violently to its wound, and although the mantas successfully herd it away, one swipe from its

massive tail uptilts the raft and turns it over, dumping VEG, CAL and *AQUILON*, as well as all their supplies.

They have no choice but to make for shore and establish camp there. And there HEX and VEG discover a footprint—their first sign of ORN.

Chapter 11: Orn

THE SPOOR was not fresh; only its protected location had preserved it. It could have been made a season ago, since the merest suggestion of odor remained. But it was sure, for his memory was strongest of all on such identification: a female of his species had roosted here.

Did she remain in the valley? Was she still alive? Could he locate her? These questions were vague and peripheral and largely beside the point. His mind grasped the fact that she existed, and his glands responded and ruled. The mating urge was upon him, no longer to be denied.

Orn spent the night under the waterfall. It was uncomfortable and tiring, on top of his preceding labors, but the discovery of a trace of his own kind prevented him from leaving. He had to begin here and follow the trail until it became fresh. Convenience was unimportant. If there were another male—but there was not; the trace was that of an unbred bird. Such things were specific, in his line.

In the morning he explored the neighboring terrain. She had been here; there had to be signs of her avenue of departure. He would discover them, however faint or fleeting.

It was not easy, but he was geared for this. He would not be able to perceive so old a trail at all, were it of any other creature

But his pumping glands sharpened his senses, and all his memories focused on this one task. His search pattern identified another trace, downstream, and a third, and he was on his way.

In two days he located fresher spoor, and in another day the roost she had used for a time. It was in the raised hollow of a rotting flat-leaf tree. Nose and eye and memory informed him that she had departed when a predatory rep had scouted the region. She had lost some feathers, but not her life.

She had fled into the mountain, perhaps as recently as Orn's meeting with the expanding sea on the other side of the continent. This season, certainly. Here the trail became exceedingly difficult, for she had passed over shuddering, heated rock in her effort to shake the pursuit. But Orn widened his search pattern and persevered, as he had to, and in time pick up the spoor again where she had descended to the valley.

Her prints and smell became mixed with those of many animals, as though she had frequented the haunts of a herd of tricers. Again he had to cast a wider net, seeking a line of emergence, and again he succeeded, as he had to. Days old now, her trail stimulated him exquisitely. She was alone and nubile, and not very much older than he; she wanted a mate, but had found none. All this he read in her spoor, knowing the signals from millennia past, and his desire for her became savage.

But he did not find her. She found him.

She had come upon his own trail, in her roundabout roving, and recognized it immediately. In less than a day she had caught up.

Orn looked up from the newly hatched brach he was feeding on, suddenly aware of her presence. Across the open space of the deserted tricer stamping ground they peered at one another. His beak was

smearred with the blood of the fleet young rep, his nose suffused with the fresh odors of its open carcass, and in this delicious and romantic moment he viewed the bird who was to be his mate.

Ornette: she was shorter than he by the width of one dry tailfeather. Her beak was slender, a delicate brown matching the scales of her muscular thighs. Her eyes were large and round, half shuttered by the gray nictitating membranes. The white neck feathers were sleek and bright, merging gracefully into the gray breast area. Her body plumage fluffed out slightly, lighter on the underside, for she had been moving through high brush. Her wings were well-kept and handsome, looking larger than they were because of the unusual, almost regressive length of their primaries. Her tail, too, had sizable retrices, and the coverts displayed the grandeur of the nuptial plumage. Even the claws of her feet glistened with natural oil. From her drifted the perfume of the distaff, at once exciting and maddening to the male. She was beautiful and wholly desirable.

Then she was away, whirling her shapely sternum about and running from him; and he was running after her with all his strength, his meal forgotten. She disappeared into high palmetto brush, outdistancing him; but it was a chase he was certain to win, for his thews were heavier, his masculine endurance greater. This was the way it was meant to be, and had been, throughout the existence of the species.

She fled toward the swamp, passing into the territory of the struth, that zealous rep so like Orn himself. That surely meant trouble, but there was nothing Orn could do about it. If he tried to circle to head her off, he would only lose distance, for she was for the moment as fleet as he.

She dodged around a giant fir, sending green sprigs flying, and sheered away

before encountering the struth. She knew! She bore north, much to his relief, though that was territory he had not scouted. Her pace slowed as the ground became marshy—but so did his own. It would be a long time before he caught her, this way. This, too, was as nature had decreed.

She ran north for a time, then veered west, toward the mountains. Soon they were ascending, leaving the steamy valley below. Flying aves scattered from their path and grazing young reps scooted away. A wounded adult tricer, come this far to die, looked up startled. Through increasingly leafy trees they went, where mams twittered in the branches, and on into the grassy elevation where arths swarmed in sunlight, but Ornette did not slacken her pace. Up until the air became cool; on until the snows began. But Orn did not feel the cold. Slowly he gained on her.

She changed course at last, running north along the fringe of white while the sun dropped toward the mountain crest. Then down again, into the valley, into the thickest greenery, spreading her wings to aid control in that precipitous descent. She gained on him again, utilizing those longer feathers, but on the level bottom where the reps roamed he got it back. And up again, almost to the snow, and still Orn gained on her, though he had never run so long without resting.

The second time they came down at the northern apex of the great valley, beyond the swamp. Here there was a higher plain, too dry and cold for the comfort of most reps though the little mams were plentiful. And here, abruptly, the light of the sun was cut off by the mountain range. It was early dusk.

Ornette stopped, panting. Orn, hardly two wingspans behind, stopped also. The chase had to halt when the sun dropped, to resume in place when it rose again. The

night was for feeding and resting and . . . courtship. Thousands of generations before them had determined this, and the pattern was not to be broken now.

The swamp spread out below from a comparatively tiny tributary stream here, and there were fish in it and mams in burrows adjacent and arths available for the scratching. They hunted, separately, and fed, separately. Then, as full darkness overtook them, they began the dance.

Ornette crossed the plain, away from him, until she was a female silence in the distance. Orn stood, beak elevated, waiting. There was a period of stillness.

Then Orn stepped forward, spreading his wings and holding them there to catch the gentle evening breeze. He gave one piercing, lust-charged call. She answered, demurely; then silence.

Orn moved toward her, and she toward him, each watching, listening, sniffing for the other. Slowly they came together, until he saw the white of her spread wings. The remiges, the rowing feathers, were slightly phosphorescent when exposed in this fashion, slick with the oils of courtship exercise; and so she was a winged outline, lovely. He too, to her.

In the sight of each other, they strutted, he with the male-gait, she the female. They approached, circled, retreated, their feet striking the ground in unison, wings always spread. Then Orn faced her and closed his wings, becoming invisible, and she performed her solo dance.

Wings open; wings closed. On and off she flashed, a diffuse firefly, her feet beating the intricate courtship metre, now steady, now irregular, always compelling. Far back into her ancestry the females had done this series for waiting males, taunting them with the nuptial ritual.

Then her dance halted, and the plain was

quiet again. Orn's turn. He spread, commenced the beat, closed, whirled, jumped, spread, and instinct carried him on irreversibly. Tat-tap-tap against the turf, the flapping of wings measured by that cadence but not matching it. A faster, fiercer dance than hers, domineering, forceful, signifying what male expression in any species signified, but artistically, and not without gentle undertones. Forward, back, around; one wing flashing, then the other, as though he were jumping back and forth. But silent, except for the feet; a pulsing ghost. Finally an accelerated beat, wings and feet together, climbing as though into takeoff—and silence.

The dance was done. Orn rested, alone in the dark, letting his heart subside. It had been a good effort, following a good chase—but better things awaited the morning. He made his way to the roost he had selected while foraging. Ornette, out of his sight as the ritual dictated, did the same.

A quick meal at daybreak. Then, as the sun struggled over the eastern pass, the chase resumed. She was fresh again, recovering better than he, and she was familiar with this terrain, and he lost ground. Up the face of the northern range, across a low, hidden pass leading into another rich valley—but she turned back into their own, south. Even to the verge of the swamp she ran, passing briars, moss and fungus that wrenched feathers from him or powdered him with spores as he charged carelessly through. At one point she intersected the spoor of a giant rep predator, and reversed her field hurriedly. It would not do to have trouble of that nature on this romantic occasion!

Up to the snows again, across a hot stream that melted its own channel through ice, down . . . and before noon Orn was gaining on her again. She was tired; her feathers no longer glistened sleekly, her

beak was no longer held high. She made to ascend once more, but he shortened the distance between them so rapidly that she desisted, staying on the contour. They were near the southeast corner of the valley now, separated from his original entry by swamp and bay.

Orn approached within a wingspan, no longer straining. She was so worn he could keep the pace easily; his season's travel had conditioned him for this, and he had recovered his strength during his days in the valley. And—he was male. But the time to catch her was not quite yet, and he dallied.

Aware of her defeat, Ornette stumbled and hardly caught herself in time. In desperation she waded out into the shallow water of the bay, toward a nearby island, but she was so gaunt and tired that this was even worse, and she had to turn back.

Orn was waiting for her, victorious. As she climbed slowly to the bank he pounced on her and buried his beak amid the tender downfeathers of her neck, but did not bite. She hardly resisted; she had been conquered. She dropped to the ground and lay there at his mercy.

Orn shook her once, not hard, and let her go. He trotted to a nearby bed of moss. He gathered a succulent beakful and brought it to her as a counter-offering. She sniffed it weakly, looked at him through the nictitating lid, and accepted.

With these first tokens of submission and of the nest they were to build and share, their courtship was done. They had found each other fitting; soon they would mate and settle, uniting their memories in their offspring.

Another morning—the first of their new life. They scouted the vicinity and decided to cross to the island Ornette had been unable to reach before. This was thickly wooded with firs, and seemed to represent a

suitable haven from most carnivores. The big land-walkers would have difficulty crossing to it, while the sea dwellers would be unlikely to venture among trees of such size, even if they were able to leave the water.

The two waded in and paddled with their abbreviated wings, entering the water while the chill remained in the air. The sea itself was warm, and they would be vulnerable to submerged predators. But the reps of the surface or shore would still be torpid, and so less dangerous than usual. Morning was the best time to forage when such creatures were near.

Not a ripple disturbed the sea, apart from those of their own motions. They crossed quickly and safely—but this was not a risk they would take again soon.

The island ground was spongy but not soggy; the matted fir droppings made an excellent fundament. Though the island was small, it was not flat. The trees ascended a mound in the center. Orn perceived it for what it was: the tip of a submerged mountain. Once it might have stood as tall and cold as the peaks of the ranges enclosing this warm valley, but its understratum had given way and allowed the bay to encroach. Its original formation had been volcanically inspired. None of that animation remained to it now, or Orn would not have stayed.

Near the water were thick stands of clubmoss, the tops of the plants as high as his head. Once this species had been a giant many times that height, but somehow it had diminished to this innocuous status, and was still shrinking elsewhere on the continent. Horsetail rushes were also abundant, though similarly restricted in size.

At the fringe of a twisting inlet they discovered the ideal nesting site: a mossy peninsula sheltered within a northern baylet. It was protected from the harsher

waves of the ocean, and from the openness of the main island. The bridge to the site was narrow, so that a single bird could defend it, and the bay itself was deep enough to discourage wading. Yet the mouth of the inlet was toothed by jagged rocks, preventing access by most large sea creatures. A stand of several pines served as a breaker against offshore wind, and the main body of the island guarded against the sea wind. The soil was rich with grubs, and small fish teemed in the inlet, and clams in the gravel below it.

Ornette was pleased, already casting about for the specific spot for the nest. But Orn was more cautious. The experience of his ancestry told him that seemingly ideal locations generally appealed to more than one individual or species. Sometimes a flawed site was actually superior, because of this competitive factor. And he was directly aware of the fate of his parents, who had nested on another apparently ideal island. Orn did not want his own chicks to be orphaned as they hatched.

The smell of rep was strong here, and there were many droppings. Something used this peninsula regularly, but he was unable to identify the particular creature before actually seeing it.

Ornette, female, had few such compunctions. Defense of the nest was not her primary responsibility; filling it was. She scratched the earth in several areas and fluttered for his attention. This spot? This? Or nearer the water?

Unable to subdue her enthusiasm without unreasonable gruffness, Orn approved a site beside the inlet. This was atop a large elevated stone, concave above, that he deemed secure from both flood tide and the intrusion of eggsucking reps and groundbound arths. A wingspan across and half that high, it was large enough for a proper nest yet had a sharply defined

perimeter. The eggs would be as safe there as anywhere in the open, and of course they would never be left unattended.

If only he knew what manner of rep frequented this locale. It might be innocuous.

All afternoon they worked on the nest, foraging amid the pines for needles and cones, and fetching moss for spongy lining. Ornette wove the long stems of shore plants into a great circular pattern and calked the interstices with the clay Orn scooped up from beneath the water. The nest would have to bake for a day in the sun before the padding was installed, and if it rained they would have to repeat the calking and wait again. Orn hoped that such delay would not happen. The nest had to be complete before mating occurred.

As the sun touched the bright crest of the mountain wall, shapes appeared in the sky. They were the huge gliding forms of the ptera, largest of the flying reps. Orn recognized the creature now, as the visual trigger activated his memory. The trees, the droppings, the odor—this was a nesting site for the enormous gliders.

The shapes came in, drifting on the rising currents in the atmosphere but steadily approaching the island. Orn stood in the center of the peninsula beside the stoutest tree and made ready for the confrontation that had to come. Ptera generally did not get along well with true birds.

Three spiraled toward him. Their wings were monstrous: four times Orn's own span. Their heads were large, with long toothless beaks and crests of bone that extended back as a counterbalance. A flap of skin stretched from the crest back above the body, serving as a rudder that oriented each creature into the wind. Their bodies had neither hair nor feathers, but scales as fragile as natal down and hardly more protective.

Orn continued to watch, remembering

more. The ptera, like the other larger flyers among the reps, had tiny legs to which the rear of the wings attached. The tail was so small as to be useless. The forelimbs that braced the wings were many times the size of the hind limbs, and the fourth phalange extended half the length of each wing. Ptera, able to glide all day without respite, could not walk on land. There was nothing to fear from this particular species; any individual who tried to attack him in the air would be at a severe disadvantage because Orn could knock it down and kill it while it flopped helplessly on the ground. A ptera could not fly from ground level.

Orn dropped his fighting stance, though he kept close watch on the visitors. One could never be certain what a rep would do, though the ptera were not notably foolish.

The three circled overhead, then evidently decided that he was not a threat and swooped at one of the pines leaning over the water. Each passed over a horizontal branch high on the trunk, let down its little legs, caught hold with marvelous accuracy and spun around.

Then the wings folded and they hung inverted, three suddenly smaller bodies wrapped in folded leather, the downy scales outward. They were well beyond Orn's reach and he, effectively, was beyond theirs. Friends the two species were not, but coexistence was feasible.

The mystery of the rep inhabitant had been alleviated. The three ptera combined would mass no more than Orn alone, for they were insubstantial things despite their monstrous wingspan. And if they nighted safely here, so could he.

Ornette was unconcernedly scooping small fish from the water. She had known it all along.

They fed together and slept that night beside the half-constructed nest, the head of each tucked under the wing of the other,

sharing warmth and love. It rained, forcing them to scramble to shelter the nest with their spread wings; but it was a good night.

The ptera were not early risers. Long after the birds had foraged for their morning meal, the three reps hung from their branches tightly cloaked. Only when the sun itself touched their bodies did they move, and then stiffly. The scant chill of this valley night was enough to incapacitate these creatures who lacked internal control of their body temperatures. Even the hairy mams were better off than that.

The nest was baking. For the present, the birds had nothing constructive to do, so they explored the peninsula thoroughly, searching out the best fishing area and the richest infestations of edible arths—and watched the reps.

The three began to stir more actively as the sunlight heated them. Their heads rotated and the small claws at the break of their wings flexed. They began to flutter gently, opening their membranes to the warmth. Those tremendous wings could trap a large expanse of sunlight, heating the entire system.

Then, one by one, the reps dropped. The first fell almost to the water before leveling out, then swooped perilously close to the surface. Its wings stretched out so thinly that the sunlight made them translucent, the veins showing dark like the webwork of deciduous leaves. The ptera flapped clumsily, its very bones bending in the desperate effort to gain altitude, and Orn felt a surge of longing. Once his own line had flown, and takeoff had resembled this. He knew the rep had to reach an updraft quickly, for its reserve of energy was small and a descent into the cool water would be fatal.

It found a favorable air current and fought its way to a safe height. The second ptera dropped, following a similar course.

But the third, the largest, did not. The wind had shifted, and that particular corridor to the sky was closed. Anxiously it maneuvered from side to side, but remained too low. The tip of one wing as it banked touched a wave, jerking the creature about. It righted itself, but now was too low even to flap without disaster.

The drama was not over. Carefully the ptera circled, coasting closer and closer to destruction but never quite touching the sea. It came in toward the island, toward Orn's nest.

Alarmed, Orn ran to protect their property. But the ptera was only trying to reach land before falling that last bit. It did not succeed. With a sick splash it struck the water, so close to the nest that Orn spread his wings quickly to intercept the flying droplets before they wet the clay and forced a postponement of his nuptial.

The ptera had reached the shallows, however, swimming ineffectively but determinedly, and was able to struggle the small remaining distance to the shore. Dripping and bedraggled, it climbed to land and lay there for a moment, watching Orn.

The creature was exhausted, cold and helpless now; it would be easy to kill. It had very nearly killed itself, bouncing over the rocky barrier to the inlet. But Orn, imbued with the romance of his newly completed courtship and sympathetic to a certain extent to the rep's plight, did not attack. Anyway, there was very little good meat on it, and he was not hungry at the moment. Had such a creature fallen near him as he struggled through the desert, it would have been a different matter.

After a while the ptera pulled itself away from the bank, scraping along on bedraggled, wet, folded wings and weak legs. It was unable to stand or walk, but it could crawl. It seemed surprised that no attack had come, but was not remaining to

contemplate the matter. Indeed, Orn was not certain he had done the right thing; it went against his nature.

The ptera scrambled awkwardly to its tree, then hooked its wing-claws into the bark. Laboriously it climbed, clinging to the trunk with its wings draped down from the bend, a dripping cape. Only when it reached its branch did it rest again, flopped halfway over the wood with its long heavy head hanging in fatigue.

At last it assumed the sleeping position, but did not sleep. It walked out from the trunk, sidestepping upside-down, until it had good clearance. It spread its wings so that the sun caught them and warmed them and made it entirely dry. Then it dropped again.

This time it completed the maneuver successfully, and disappeared proudly into the sky.

That day they watched the other pteras feeding by swooping low over the waves and scooping small fish into their long bills. Because they did this at high speed and always facing the wind, they were able to touch the water and recover elevation without being immersed and trapped, and the massive rearward bones of their heads balanced the weight of the solid morsels they lifted. It was a graceful operation.

Orn hardly cared about the life and fate of any given rep, yet in some fashion his act of mercy enhanced his relationship with Ornette. Together they gathered the last of the supplies they required. All day the sun shone without remittance—unusual, for this valley—and by late afternoon they decided the clay was firm enough. They packed in the lining layers and made the nest smooth and comfortable.

That night they occupied their nest for the first time, snuggled pleasantly together within its bowl. And Ornette presented, and they mated at last, while the three ptera

hung silent.

Chapter 12: Aquilon

SHE HAD SLEPT in close proximity to these two men before, both on the planet Nacre and the raft Nacre. She knew them well and loved them both. But now she felt an increasing discomfort, a sense of impropriety. She had almost decided to leave them rather than continue to come between them, back when they had orbited Earth in the quarantine capsule. Events had prevented that, but did not really dispel the mood that had precipitated the decision. For surely she *would* come between them, and be the cause of sorrow and misfortune, if she remained a member of the party. She felt the female urges within her, compelling her to—

She peered at the roof of the leanto, invisible in the darkness but present to her mind's eye, for she had spent hours plaiting it. Yes, she felt compelled—but to *what?*

To choose.

Aquilon was a woman. She had breasts and they were not simply for appearances; she had thighs and not entirely for walking. She was long past adolescence. But she had not felt the need of the physical male until—until that agent Subble had aroused her, somehow, back in her tight Earth apartment, and turned her down. She had never realized before that a man could do that to her, and it had been a shock. When she had had no smile, she had bypassed social life, of course; but that new smile had seemed to open all the world to her, to lay waste all prior mysteries. Subble had routed that euphoria.

She had not loved him, those few hours they conversed, but she had felt his

controlled masculinity tangibly. He had made her realize that the love she professed for Veg and Cal was an intellectual thing possessing no physical substance; a sympathetic resonance of the love they professed for her. She had never actually imagined herself undertaking a sexual relation with either.

Subble had been an agent, in more senses than one. He could move with seemingly irresistible speed and force and accuracy, yet hold a difficult pose indefinitely without sagging. He could talk philosophy and he could kill without compunction. He was handsome, yet ruthless even in his kindness. He was a body like Veg's, a mind like Cal's. He had understood her.

Subble had died, making any consummation with him, however theoretical, a waste of emotional effort. Of course there were hundreds, perhaps thousands of agents virtually identical to him, and designed to be exactly that, computerized. But it had not been the assembly-line physique and mind that made the connection between him and her; it had been their mutual experience. *The Subble* was gone forever; the close resemblance of other agents was irrelevant.

That threw her back into the trio—with a difference. It had taken her this long to realize it.

But what to do about it?

She fell asleep without an answer. Her dreams, however, were not of love; they were of *Brachiosaurus*.

The explorations of the next week banished any doubt they might have entertained about the nature of this region. They had struck paleontologic gold. This was a thorough Cretaceous enclave in the Paleocene world. The full spectrum of the golden age of reptiles was present—a vast pyramid of ecology, with inordinately

plentiful small forms, largely mammalian, and lesser numbers of larger, dominant reptiles. Here, in fact, there were dinosaurs.

Ten miles up the shore, northwest from their camp ("There's nothing so permanent as a temporary camp," Cal remarked, and smiled for some obscure reason), the ocean inlet became the delta of a southbound river. It was evident that the towering mountain chain had once enclosed a salt water bay some forty miles across and sixty deep, but almost all of it had been filled in by the rich silt and debris of the river to form a tremendous warm swamp. Its center was a freshwater lake, swollen daily by ungentle rain, overgrown by soft vegetation, while its fringe rose up into the foothills of the giants. All of it was tropically warm, near sea-level, the nights dropping down to a temperature of about 65 °F, the days rising to 85°, with the predominating level toward the higher end of that scale.

In the direct sun it was much hotter, of course. At midday hardly a reptile moved. They were all hiding in whatever shade was available, predator and prey together. She had forgotten how much reptiles liked to rest.

The corner of the delta nearest them was the sporting place of several families of duckbill dinosaurs. Cal insisted on using the proper classification terms—the "family" being ranked below "order" and above "genus"—and of course the reptiles did not have families in the social sense. But they did associate in small or large groups, except for the carnivores, and she preferred to anthropomorphize to that extent.

In the liquid portion of the swamp a lone *Brachiosaurus* browsed, perhaps the same one they had encountered so awkwardly upon their arrival. It consumed anything soft that grew within range of its neck, and once she saw it scoop up a fair sized rock. Cal had abated her astonishment: it

developed that such reptiles normally swallowed rocks to aid in their digestion of sturdier morsels. Long periods of stasis were required while the voluminous and tough material being processed was crushed and gradually assimilated; this was one reason, he explained, why mammals and birds were far more mobile than reptiles on a twenty-four hour basis. Superior digestion eliminated that torpor. She decided that she'd feel torpid too if she had to let rocks roll around in her stomach.

Sometimes the sauropod disappeared entirely, and she presumed it was taking a nap under the surface. It was an air-breather, but probably it could hold its breath for a long time without particular discomfort, much as a whale did—or would do, tens of millions of years hence.

Across the bay near the eastern mountains were more duckbills, these ones grotesquely crested; she meant to have a closer look at them in due course. And in the plainlike reaches between slush and mountain, where fern-trees and cycads were particularly lush, were herds of *Triceratops*, plus scattered *Ankylosaurus*, both armored reptiles of considerable mass. Truly, it was a paradise of paleontology.

And Cal, the paleontologist, was becoming more and more depressed. She found this hard to understand. Cal had a pessimistic view of life, but there was always sound reason behind his attitudes. If only he would explain what was bothering him!

Meanwhile, she drew a map and filled in all the details observed and conjectured to date. She put in the volcanic mountains, and Scylla and Charybdis, and their camping place. She marked a dotted line to show their route of entry. Perhaps this could serve as an adjunct to Cal's eventual report.

They found a better location about twenty five miles north and made a second, more permanent camp beside a streamlet

coursing down from the western range. She updated her map accordingly. There was a pleasant waterfall nearby, and hilly ground that seemed to be secure from the plains-dwelling armored dinosaurs, and the air was cooler here. She liked it very well. Veg, exploring indefatigably, said there was a snowy pass through the range at the head of the stream, and some hot areas of ground: even the silent volcanoes were far from defunct.

There was danger here, certainly; there were savage predators larger than any existing on Earth before or after, though she had seen only their tracks so far. But danger was not objectionable per se, so long as one did not push one's luck. This was a visit in history, in historical geology, an experience like none possible to any homebound person. So very like Earth . . .

Like Earth? It was Earth, according to Cal, though he hadn't spoken on that topic in the past month. She kept forgetting that. Perhaps it was because she thought of Paleo as a world in its own right; or maybe she simply could not assimilate the notion that something she might do here could change her own world, perhaps even eliminate the human species and extinguish her too. Then she could *not* come here, because she didn't exist, so no change would be made after all . . .

No, it made no sense, and this was Paleo, and she refused to be ruled by fears of paradox.

But there were mundane problems. The insects were fierce, after they had zeroed in on the new arrivals, and all three of the humans and for all she knew the mantas too had welts from nocturnal bites. Someone had to keep watch part of the night, because they had agreed that it wasn't fair to make the mantas assume the whole task. That meant that one of the three was generally short of sleep and temper. It was surprising

how quickly a nagging itch and insufficient rest could flare into personal unpleasantness. And the food—

Her hands were raw and her nails cracked from scraping in the dirt for edible tubers. Veg ate no meat at all, and she had stopped doing it the past few months, but now the thought of roasted fish was tempting indeed. Coconut was fine, and so were the few small berries growing on the mountainside, and she had pounded nutlike fruits down into powder for something vaguely like bread, baking it laboriously over the kerosene burner. But the lush greenery of the waterside was tough and stringy and internally gritty even when thoroughly cooked, and tasted of creosote. It made her appreciate why Brach needed rocks in his belly to grind it up; he couldn't stand to keep it in his mouth long enough to chew it! The Tricers didn't bother; she had seen them biting off entire fern-trees, and chewing up the trunks, their beaks and phenomenal back teeth like sawmills. Cal had explained that too: the Tricers had multiple rows of teeth set one on top of the other, the worn ones being replaced automatically with new. And the upper jaw did not meet the lower directly; the teeth slid past each other in a sheering action controlled by jaw muscles a yard long. To think that some researchers had theorized that the dinosaurs died out because they could not chew the flowering plants!

For the supposedly superior dentition of the human beings, the softer tubers were better—but some made her sick, and she could not be sure, yet, which. The effect seemed to be delayed and inconsistent. Cal did eat fish, and also cooked fat lizards without compunction, and had no trouble. By unspoken agreement he did it alone; none of them were sure to what extent their dietary differences were ideological or physical, but no one criticized another in

this one area, even when tempers were shortest.

She saw it coming: in time she would change over again. On Earth she had been appalled at the manner animals were raised in cruel captivity for slaughter, but here the animals were wild and free and able to look out for themselves, and it was the natural order that the weak or slow or stupid become food for the strong and swift and clever.

But mainly she was hungry, and her tastes were falling into line. What held her back was the fear that she moment she reneged on vegetarianism, Veg would turn from her, and thus she would have made her choice of men involuntarily. Perhaps Cal, with his brilliant mind and strength of will, would be the one anyway—but she wanted to make the decision freely, not via her intestines.

Meanwhile, too, there was considerable drudgery in paradise.

She broke from her task—picking over a basket of objects resembling beechnuts Veg had gathered from somewhere, to eliminate the green or rotten or wormy ones (about half the total!)—and picked up her sketch pad. At least she still had that: her painting. She headed downriver, in the direction of chopping noises.

Veg was hacking down selected hardwood saplings, comparatively rare in this valley, and skinning them. He had a row lying nude in the sun, each about six feet long and one to two inches in diameter, depending on the end. He was using his hefty scout-knife, rather than attempting to harvest the slender trees by axe, and his large arm-muscles bunched handsomely as he worked.

Yes, she thought, he was a powerful man, if not really a handsome one. Hardly the kind she would have taken for a vegetarian, a hater of killing. A strong, strange man, for all his simplicity.

"What are you making?" she inquired at last.

"Quarterstuffs," he grunted.

"Quarterstaff? Isn't that a weapon?"

"Yeah. We lost our steam rifle in the turnover, and there are animals here even that wouldn't faze. Got to have something. Staffs are defensive, but effective."

"But a weapon—"

"Defensive, I said!" Last night had been his turn on watch, the human half, and he had whistled cheerfully. But now he was feeling it. She knew what four hours of sleep felt like, but still didn't appreciate his tone.

She kept her voice level. "You mean against a dinosaur?"

"I figure you could jam it down his throat, or maybe stop his jaws from closing on you, or just bop him on the nose. Lot better'n bare hands."

She eyed the slender poles dubiously. "I wouldn't care to try it on Triceratops. He'd bite it right—"

"Nobody's making you!" he snapped.

Affronted, she walked away. She was disgusted with herself for reacting emotionally, but she was angry at him too. He didn't have to yell.

She found Cal further downhill, north of camp, observing a small tame dinosaur. She had seen quite a number of these innocuous, almost friendly little reptiles about, for they usually grazed in herds of a dozen or more. This one was about five feet tall with a head of considerable volume compared to the average species of reptile. Brightly colored tissue surrounded its face, red and green and yellow; it circled all the way around its head and rose above in a spongy dome. Aquilon had no idea what such a display did for its possessor, but remembered that evolution always had realistic purpose.

The creature was nibbling bracken, and though it looked up as she approached, it

returned to its meal when she halted. Harmless, certainly; had it been a predator, it would have attacked or retreated immediately. Aside from that she could tell by its tooth structure that it was herbivorous.

She came to stand behind Cal, knowing the sound of her voice would spook the beast. She opened her sketch pad and painted the dinosaur's portrait, not one to miss the opportunity. Her paper, fortunately, had been salvaged from the raft-wreck, though each page was discolored around the rim. Perhaps it was not as valuable materially as the radio equipment, but she was much happier to have it.

She was intrigued by this reptile. It looked defenseless, and its head was so large and tall! Did it have a brain capacity rivaling that of man? Could it be intelligent, in human terms? Its actions suggested nothing of the kind, but—

When she finished, Cal handed her a sheet of his notes. Usually he employed the voicetaper, but this time he had been doing it by hand, to preserve silence. She looked at the crude writing: "TROODON, 'bonehead' ornithiscian. Solid bone skull, small brain."

Solid *bone*? That skull she had thought to contain a massive brain . . . What a waste of space!

There was more, but she looked up to see one of the mantas approaching. The little dinosaur took alarm and bounded away like a huge rabbit, keeping its head erect.

"Why all bone?" she demanded, free to speak now. "Doesn't it just slow it up, when there is danger?"

"That has bothered paleontologists for some time," Cal admitted. "I'd very much like to see Troodon in a situation of hazard, and make notes. At present I can only conjecture. A large carnosaur would ordinarily bite the head off one that size, as

the best way to kill the creature rapidly. The body would still cast about a bit, but the predator would be able to hold it down and feed on the carcass at leisure. But if it sank its teeth into Troodon's soft-seeming skull . . ."

Aquilon laughed. "No teeth! It wouldn't try *that* again!"

"Not exactly. There are several inches of fleshy padding around the bone, that would cushion the impact. And the carnosaur would soon learn to take in the entire head, not part of it, and so succeed. But this would still be a respectable mouthful, perhaps quite tasty—yet unchewable. I think that by the time the meat were off the bone, the others in the herd would long since have taken advantage of the carnivore's preoccupation to get away. So it would be an indirect measure, protecting the herd more than the individual."

"That's a grisly mechanism!"

"Yet it would seem to limit herd liability, and perhaps discourage careless predators entirely. We do observe a thriving population of this species, at any rate."

The manta had arrived and settled into its lumplike posture. "What is it, Circe?" she inquired, knowing that there would be valid reason for such an interruption. More and more, the mantas were keeping to themselves, associating only loosely with the human party. One always showed up for watch at night, and they certainly were not hiding; but they seemed to prefer their own company. Communications were adequate; she could understand Circe quite well now.

STRANGE—IMPORTANT, the manta signaled with that combination of gesture and tail snaps they had gradually worked out as their code.

"Dangerous?" She remembered how well Circe's warning had served the first time, when the tsunami came.

NO. But the denial lacked full force,

showing probability rather than certainty. THIS. And Circe snapped her tail in the dirt four times, leaving a mark like a footprint.

"The bird!" Cal exclaimed. "The bird that made those tremendous prints we saw at Camp One!"

YES. TWO, Circe indicated.

"What's so distinctive about a large bird, here in the land of giants?" Aquilon asked Cal.

"It may be our substantial evidence that this is a discrete world."

"Discreet world? Oh, you mean 'ete'—discrete, separate, not an alternate?"

Is an alternate. A world parallel to our own in virtually every detail, but distinct. The concept is certainly more sensible than that of temporal displacement."

"By that term you mean time travel? Changing the past? Paradox?" As though she hadn't worried about it too!

"Something like that. The resemblance of Paleo to Earth is far too close to be coincidental. The size of it, the gravity, atmosphere, every matching species—but we've discussed this before. I've been assigning Earthly nomenclature because it fits, but I simply can not credit time travel. There has to be another explanation, and the alternate-worlds framework can be made to fit."

"Back where we started from," she murmured. "But Earth didn't have dinosaurs during the Paleocene."

"We can't be sure of that, 'Quilon. This is an enclave, isolated rather stringently from the rest of the continent. It could have happened on Earth, and have been entirely destroyed, so that no fossils remained as evidence—or merely be buried so deeply that we haven't discovered them yet. This location, particularly, would be subject to such an upheaval. I'll certainly check that out when . . ." He paused, and she knew he was remembering their banishment.

They could not return to Earth soon, if ever, even if they wanted to. "It *could* have happened, and I rather think it did. The San Andreas Fault of our time is the landward extension of a Pacific oceanic rift. The continent has overridden it, burying enormous amounts of undersea landscape. This valley could be part of that vanished structure, the mountains a reaction to the extreme turbulence of the area. There is nothing here inherently incompatible with what we know of our own world."

"I'm not sure I follow all that," she said, wondering which of them he was straining to convince, and why the point was suddenly so important. "But I gather that Paleo either is or is not Earth."

He smiled momentarily. "That would seem to cover it. This *could* be Earth—except for that pair of birds Circe reports. Everything else fits, except the chronology of some of the reptiles, such as the pteranodons. They should have become extinct before—"

"But a big bird *doesn't* fit? I'd think that two birds would be easier to explain than a whole enclave of anachronistic dinosaurs."

"Not so. The enclave is merely a remaining pocket, a brief, geologically speaking, carryover. The bird—one of this nature, this early—would have had to evolve over the course of millions of years, and it would have ranged widely. There would have been fossils, other evidences of its presence."

"Cal, that sounds thin to me. There are so many giant gaps in the fossil record—"

"Quilon, we are faced with drastic alternatives. If this *is* Earth, we are faced with paradox. Paradox can't exist in practice; nature will resolve it somehow, and we might not like the manner of that resolution. Not at all. Principle of the monkey's paw."

"The what?"

He didn't seem to hear her. "But if this is *not* Earth, the implications are equivalently awkward. It is necessary to know."

"But it's ridiculous to claim that one bird—I mean *two* birds—that we haven't even seen—" She stopped. She had just left an argument with Veg, and now was provoking one with Cal. Whatever the geological, ecological, paleontological, philosophical implications, their discussion would not affect the truth, and it was silly to let it prejudice their personal relations. Cal obviously had something more than a mere bird on his mind; that was a pretext to cover what he refused to discuss. Otherwise he would surely have seen his own illogic.

It was her place to smooth things over, not to aggravate them. "Let's go see!" she said.

Cal nodded.

They rejoined Veg, who seemed to be in better spirit now that his self-appointed task was done. Aquilon didn't mention their prior exchange.

"How far?" was all Veg asked.

Circe explained: twenty miles across the water.

They used the raft, rather than make the dangerous trip around and through the unexplored swamp. They backtracked to Camp One, rebound the Nacre, and poled as far as the remaining day permitted.

It was good to be afloat again, Aquilon thought as she lay wedged between the two men in the cabin. Somehow, aboard the raft at anchor, decisions were not so urgent, and she appreciated the fact that the security of their position allowed all three to sleep at once. It would otherwise have been her night to stand guard . . .

They had merely to pull together as a team of three, while the mantas relaxed, wherever it was that the four were spending this night. Let the theoretical questions settle themselves. Here it was nice.

"Oh!" She jumped as a cold wash of water slid over the cabin floor, soaking her derriere. She had forgotten about that hazard. Tomorrow she would set about recalking the Nacre . . .

Next day they beached the Nacre on the south shore of the small island Circe indicated and proceeded forward overland. They were quiet and cautious, so as not to frighten the anticipated birds. Each carried one of Veg's new quarterstuffs, just in case.

There was no excitement. The island was nothing more than the long-eroded peak of an ancient volcano, covered with firs and pines and surrounded by deep water. No large reptiles were in evidence, though there were some Duckbill footprints. The human party crossed without event to the north side and discovered a tiny peninsula-and-inlet complex.

A bird five feet tall stood guard at the neck of the peninsula. Veg marched at it, poking with the end of his quarterstaff. "Shoo!" he said.

The bird did not squawk and flutter away in the manner Veg evidently expected. It spread its wings, which were quite small for its size, and struck at the pole with its great curved beak. As Veg drew back, surprised, the bird raised one powerful leg high in the air.

"Careful, Veg," Cal called in a low tone. "That's the one we're looking for, and it's dangerous. It's a predator—a killer. Look at that beak, those talons, those muscles. It could disembowel a man with one stroke of that foot."

Veg had come to the same conclusion. He brought the quarterstaff around sharply, striking the bird midway down its long neck. The bird fell back a pace, hurt.

"Oh," Aquilon exclaimed, putting her hand to her own neck. She didn't want the bird to be injured, particularly if it were as

rare and significant as Cal intimated. It wasn't, of course; could not be. But it was a remarkable specimen in its own right.

She looked beyond it and spied the second bird, perched on a rock near the water. Worse and worse—that would be the standing one's mate, sitting on her nest. She would have moved by this time, either to come to the aid of the male or to join him in flight, if she were free to do so. The fact that she stayed put meant that she had eggs to protect and warm.

The humans were intruders on a nesting site, trouble-makers, gawkers.

But Veg had now seen this too: Embarrassed, he retreated. "Sorry, pal," he said. "Didn't know it was your home. Thought you were just getting in the way. Sorry."

The bird watched him, standing unsteadily, neck crooked where it had been struck. The second bird watched also, from the nest.

Veg, backing away, had forgotten where he was. He stepped off the narrow bank and toppled beautifully as his foot came down on water. The quarterstaff flew up as he went over, flailing. There was a tremendous splash.

Aquilon couldn't help laughing. The change from crisis to ignominy had been too sudden. Then, to cover up, she trotted to the bank to see what help she could offer.

Circe stood a few yards away, watching but not participating. What had passed through the manta's mind as she watched this farce?

The male bird peered at the scene but did not move either. As Veg staggered out, dripping, and Aquilon assisted him, it unlinked its neck and reached down to peck exploratively at the forgotten quarterstaff.

The human contingent withdrew. The manta observer disappeared. The bird remained at the neck of the peninsula until

contact was broken. Aquilon held back just long enough to sketch its proud portrait.

They camped on the (calked) raft again, anchored south of the island. They consumed their respective suppers without conversation, and lay down together in the cabin when it became dark.

"That bird is intelligent," Cal said. "I suspected as much from its foraging habits. Did you observe the way it reacted? None of the blind animal instincts. It was studying us as carefully as we were studying it."

"I wish you'd told me that was the bird we were looking for," Veg complained. "Here I was, trying to scare it away—I thought you wanted some giant!"

Aquilon stifled her laugh. The unforeseen problems of communication! Veg must have imagined a bird proportioned on the scale of *Brachiosaurus*! The fabled roc . . .

Then she thought of something else. "How did you know how it foraged?" she demanded of Cal.

"I followed its tracks, naturally." She heard Veg stifling his own laugh, at her expense. She had overlooked the obvious, much as he had.

"I lost the trail in the marsh," Cal continued, "but I learned enough to convince me that the originator resembled Class Aves about as man resembles Class Mammalia. That was significant. So I asked the mantas to watch for it."

"Now he tells me," Aquilon muttered, chagrined. Of course a really intelligent bird would be a different matter. She, like Veg, had been thinking only in terms of size, and probably it hadn't occurred to Cal that either had misunderstood him.

"Now that I have seen it directly, I'm almost certain," Cal said enthusiastically. "No such creature walked our Earth in Mesozoic or even Cenozoic eras. This is Earth—but a parallel Earth, not our own.

Very similar, but with certain definitive differences developing. And there is a displacement in time, so that this world runs about seventy million years behind our own, geologically. Perhaps there are an infinite number of alternates, each displaced by an instant of time instead of by physical distance. Our connection happened to be to this particular alternate, Paleo—a purely random selection. We could as easily have landed on a world removed by a single year, or by five billion years."

"Or one ahead of ours, instead of behind," Aquilon murmured. Cal had not been joking about the implications being as severe as time travel. What Pandora's box was opening up for mankind with this discovery?

"It may be possible to trace the entire history of our own Earth, simply by observing the progressive alternates, once the key to their controlled discovery is perfected. But in the interim we are free to manipulate this specific world to our advantage, knowing paradox is not involved."

There was something about that phrasing Aquilon didn't like.

"I don't know what you mean, friend, but it doesn't sound good," Veg said. "What do you want to do with Paleo?"

"Why, open it for human colonization, of course. It is ideal for Earth's population overflow. Same gravity, good climate, superior atmosphere, untapped natural resources, few enemies—apart from certain reptiles of this one enclave, and perhaps scattered others. This could be preserved as a zoo; it will be invaluable for research."

"Colonize?" Aquilon didn't like the sound of this any better than Veg did. "This is an independent world. Who are we to take it over for our convenience?"

"We are men, generically. We must consider the needs of men. To do otherwise

would be unrealistic."

"Now let me get this straight," Veg said in his play-dumb fashion. She could feel the tenseness of his body as he lay beside her. "You say we should turn in a report saying that *Paleo* is A-Okay for people to come in and settle, and make it just like Earth. And if a few birds or lizards get in the way it's their tough luck?"

"Well, provision should be made for the fauna. I would not condone genocide, particularly in so fine a paleontological laboratory as this. But apart from that your summary is essentially correct. This is a wilderness area, and Earth needs it desperately; it would be a crime against our species to let it lie fallow."

"But the bird," Aquilon protested, her heart beating too strongly. "You said it's intelligent. That means *Paleo* is technically inhabited—"

"Intelligent for *Aves*: birds. That can't approach human capability. But yes, it is most important that this—this *Ornisapiens* be preserved and studied. It—"

"Orn," Veg said, simplifying again. "In a zoo."

"No!" Aquilon cried. "That isn't what I meant. That would kill it. We should be *helping* it, not—"

"Or at least leaving it alone," Veg said. "It's a decent bird; it didn't jump me when it had the chance, after I'd hit it with the staff, too. We don't need to lock it up or help it, just let it be. Let them all be. That's the way."

"We appear," Cal remarked, "to have a multiple difference of opinion. Veg feels that man can not sit in judgment over the species of *Paleo*, either to assist or to exterminate."

"That's what I feel," Veg agreed.

"Quilon feels that the bird, Orn, deserves assistance, because of its apparently unique development as a

creature distinct from Earthly genera. Obviously Orn is not common here, and may be in danger of extinction."

"Mmmm," Aquilon agreed. Cal was that most dangerous of opponents: the one who took pains to comprehend the position of his adversary.

"While I feel that the needs of our own species must take precedence. It is nature's decree that the fittest survive in competition, and if Man *can* control this world operating from a tiny beachhead in the Pacific, he deserves to and is required to. The fact that the animals here resemble those of our own past is irrelevant; our species must have room to expand."

"*Lebensraum*," Aquilon whispered tersely.

"Adolph Hitler's term," Cal said, picking up the allusion immediately, as she had known he would. "But he used it as a poor pretext for conquest."

"Aren't we?"

Cal shrugged in the dark.

She felt herself getting flushed. "Suppose some other species—maybe an advanced version of Orn—had felt that way about our own Earth?" she demanded. "Suppose they had come when we were apelike primates, and used advanced technology to push us out?"

"We'd have deserved it. We're *still* apelike primates."

"Maybe we should vote," Veg said.

"No problem," Cal said. "Are you ready, mantas?"

From the roof came a tap—the contact of a manta's tail on the wood. Aquilon was startled, though she should not have been. They had probably come after dark and viewed the leaking sound waves, thus picking up the entire conversation. Cal had certainly been aware of the audience, and he seemed to have confidence in the outcome. Why?

Veg was silent also, probably wrestling with similar concerns. How, she wondered hurriedly, would the manta-mind view this crisis? They saw things in terms of their own Nacre framework, manta framework—carnivore, omnivore and herbivore, with rights and wrongs being interpreted through this. Veg's vegetarianism had been the original key to contact with these creatures, since they had seen him as theoretically in need of protection from the omnivore of the party: her. It wasn't as simple as that, Cal had maintained; but as an analogy it would do. Of course she had shifted from omnivore-type to herbivore-type, while Cal had gone from carnivore to omnivore; apparently the mantas were now wise enough to the ways of man to accept these changes. All human beings were true omnivores, regardless of their diets of the moment; man's brutal nature defined him.

"What do birds eat?" Veg inquired.

It was a stupid question and no one replied. Veg knew what birds ate; he was a veteran bird-watcher. Funny, she realized now, that he had treated the orn so brusquely. Perhaps he only identified with small birds, the seed-eating, fly-chasing kind. As a species, of course, birds were omnivorous.

Omnivorous.

The question had not been stupid at all. Suddenly she knew which way the manta-vote would go. "No," she said, trying to control the tremor in her breast. "Don't vote."

"Why not?" Cal asked her. He knew his advantage, and was pressing it ruthlessly despite the mild words. In body he was small, in mind a giant—and that went for discipline as well as intelligence.

"It's too important," she said, dissembling, knowing she could not prevail against him, and that Veg would be even

less effective than she. Cal had the brain and the votes. "Before, it was only where we wanted to go as a group, not a really critical decision. This time it's the fate of an entire world. *Our* world, or one very like it. This isn't the mantas' business."

She saw the teeth of the trap and scrambled to avoid them. "Colonization would destroy Paleo as it is, you know that. They'd decide the dinosaurs were a menace to tourists or navigation or something, and wipe them out. So we can't decide a question like this by ourselves."

"I was hardly suggesting that we should," Cal replied calmly. "We have merely to make an honest report to the authorities on Earth, and let *them* decide."

"But they're omnivores!" she cried, knowing this implied that she endorsed a dishonest report. Omnivore—she meant it as a description of character, not diet. The omnivores of the planet Nacre were utterly savage, with virtually no redeeming qualities, in her terms. This was in contrast with the innocuous herbivores and deadly but disciplined carnivores. The term "omnivore" had come, for her, to represent all that was despicable in life. Man *was* an omnivore, and had already demonstrated his affinity to the Nacre breed. That ruthless action on Earth itself to eradicate potentially dangerous fungus spores—

"So is Orn," Cal said.

"That isn't what I meant!" she exclaimed, defensively angry.

"You're being emotional rather than rational."

"I'm a woman!"

There was a freighted silence.

Cal was right, but she knew he was wrong, ethically. Cal had decided against Paleo the moment he was assured that it was safe to do so. The mantas wouldn't care. The Earth authorities would be concerned only with exploitation of natural resources

and the temporary relief of population pressure. They would much prefer to devastate another world, rather than to abate the mismanagement of the first. There was no one she could appeal to.

"I can't participate in this," she said at last. She got to hands and knees and crawled out of the cabin, leaving the men lying there separated by a woman-sized gap. She was dressed; the niceties of contemporary convention were ludicrous here.

She stood aboard the raft in the gentle night wind, looking across the moonlit water toward the island. Large flying insects hovered about her head and tried to settle on her. She jerked her hood up and fastened the mesh over her face, batting it against the sides of her head to clear it of trapped arthropodic life. Then she drew on her gloves, so that no portion of her skin was exposed. The night was warm, and this confinement made her hot, but it was better than submitting to the appetites of the winged ones.

It was stupid, it was cruel—but it would be worse to go along with this genocidal majority. She had witnessed the ways of man on Earth, and could not bear the thought of the rape of Paleo that was surely in the making. So—she had to go her own way, whatever that might mean.

She looked over the black water. She would have to swim. At least that would cool her off! The chances were that no large marine predators were near. The reptiles didn't seem to be active at night, generally, and their size kept their numbers down. Still, she hesitated, sadly confused inside. She tried to tell herself it was because she knew *Ichthyosaurus* was a night hunter, because of those pumpkin-sized eyes . . . but it was the separation from those she had thought lifetime friends that really dismayed her. How could she return, once she made this break?

There was the scuffle of another person breaking through the cabin net, and Veg stood up beside her. "Better your way than his," he said.

She experienced a choking surge of gratitude toward him. She had made her decision on her own, not presuming his. The ties between the two men were strong, however different their temperaments and physiques might be. She had not even thought what she might do, by herself, or how she would live. Now she was immensely relieved to know that she would not be alone.

"We'll have to swim," he said, echoing her own thought. "You were headed for the birds, weren't you?"

She hadn't planned that far ahead, but it seemed to fit. The schism had started with the birds, really.

She touched his arm, not wanting to speak within the hearing of Cal, or even to gesture, knowing the mantas were watching. Cal was the weakest member of the group (physically!) and the raft required muscle to operate. Muscle the mantas could not supply. By leaving him, they were marooning him.

"I'll check back in the morning," Veg said. "We'll work it out." He dived into the water, making a phosphorescent splash.

Relieved, she followed him.

Chapter 13: Orn

WELL AFTER DUSK Orn lifted his head, disturbed. Beyond the normal noises of the night he perceived a differing manifestation, and in a moment placed it: the awkward progress of the monstrous mams.

The confrontation of the day still

distressed him. The really strange or inexplicable or completely unremembered bothered him because he did not know how to deal with it, and this recent encounter had been all of that. Mams themselves were familiar enough; they were everywhere, more plentiful by far than the reps even here in the heart of this enclave. Elsewhere on the continent they were larger and bolder and farther developed than were the primitive samples here. But nowhere did they approach the size of either Orn himself or any of the larger reps, except perhaps for their largest and stupidest herbivores. He had adapted to the changed situation in the world and learned to cope with the new creatures, before settling into this more familiar valley. But to be so abruptly confronted by bipedal mams larger than himself—

That shock had very nearly cost him his life. He had stood bemused by the appalling gap in his memory, trying to fathom the life history of the species so that he might know how to deal with it. Size was only one feature of many; these mams were *different*. Their myriad peculiarities had rendered them nearly invisible to him at first. Only his prior practice in visualizing unfamiliar creatures in terms of familiar ones had enabled him to grasp their nature at all.

Meanwhile, one of the creatures had approached and made contact. Orn, mindful of Ornette and their two precious eggs, had had to act to repel the intrusion.

The mam had struck him with an inanimate object, another astonishment. Orn had never realized that such a thing was possible. Inanimate things could be used for roosting or nest-building, or even riding across rough water, but never for the work of claw or beak. Hitherto. What could it mean?

And the final fluke: the mam, having by its alchemism rendered him vulnerable, had

failed to kill him. The creature had instead plunged into the water and retreated, and the others with it. If they had come to fight and feed, this was nonsensical.

He remembered the way he had spared the ptera, that first day of their nesting. It was possible to abstain from easy victory, in the absence of hunger. Yet that offered no comprehensible clue to the behavior of the big mams.

Orn ruffled his wings restlessly. He was not equipped to think things out; his memory ordinarily made such effort unnecessary. But now that huge mam was coming again, in the night. Orn had to react, and to protect himself and their nest more effectively than he had before. No ancestor had faced this particular problem.

At least this night attack was in character. The mams, like the aves, were able to move about as readily by night as by day, and a number preferred the cover of dark for their foraging. Indeed, many would not survive long in this homeland of the reps otherwise, for there were many empty bellies and sharp teeth on patrol by day, and mams were tasty morsels. Only by occupying regions too cold for the reps and by feeding at night had the mams prospered.

But these were so clumsy! If the creatures—only two were coming this time—were hunting, they would never overtake their game so loudly. If they thought they were hiding, they were disastrously inept. Was it that they were so large for their type that they were stupid, like the brach swamp dweller whose plentiful young were such ready prey? But even the mam amblys were more careful of their own wellbeing than that!

Yes, they were coming here. Orn raised himself from the nest and Ornette moved over to cover the eggs fully. One of them had to warm and guard the eggs at all times, and Ornette, gravid with the third, did not

forage at all now. Three times they had made connection, and two of the eggs were incubating. The final one was due tonight, and a disturbance would be harmful. He had to guard the nest from every threat.

He strode to the isthmus and waited for the two lumbering mams. Male and female, both grotesque in their inept giantism. What their mission was he could not know, for they lacked the furtive manner of egg stealers. But he would turn them back. There was a bruise under the feathers of his neck, from the previous encounter, and the muscles there were sore, but it had been an important lesson. He would not let such an object strike him again, not stand dazed. He would kill the first mam immediately and be ready for the second.

They arrived. Orn waited, standing just behind the narrowest section of the isthmus so that they would have to approach singly. Perhaps they were egg-stealers after all, depending on brute strength rather than stealth. He twitched the claws of one foot in the turf, ready to lift and slash ferociously. The eggs must not be imperiled!

"He's there." It was the male, making some kind of hissing growl that still did not quite resemble a challenge to battle.

"Veg, he thinks you're after the eggs. Don't go near him." That was the female, her growl more sustained and variegated. It was as though she were cautioning her mate about the coming encounter.

The male halted in bright moonlight about four wingspans from Orn. He held a length of tree in his paws—the same object that had surprised Orn before. It was in fact a substitute beak or claw, for the mam had no effective armament of its own. Orn visualized it as the latter, for it attached to the limbs. He would have to strike around it, diving for the open throat or gut.

But the mam did not make an overture for combat. He stood for an interminable

period, while the female stroked a twig against a flat object. Orn comprehended neither the action of the female nor the inaction of the male.

"I've painted his portrait. We'd better leave him alone." Noises from the female again, as she concealed her twig and tucked the flat thing under one forelimb.

As though that senseless series of female squawks were a signal, the male dropped his length of barkless tree and took a step forward.

"Veg!"

There was no mistaking that cry of alarm. She understood, at least, that the male was on the verge of an encounter likely to end in disembowelment. Orn would not permit it near the nest.

Still the creature approached, taking great slow steps, pausing between each. Now it had its fleshy forelimbs behind it, exposing his entire torso. It was only two wingspans distant, entirely unarmed and vulnerable; Orn could leap across that space and stab the large mam heart he sensed, then retreat to the superior position on the isthmus. But he held back, leery of attacking when he did not comprehend the meaning of the mam's actions and could not interpret them in terms of any similar creature. It could easily be a death trap for himself.

Another step, and now he was aware of the tension in the mam. It was afraid, yet determined; not in a kill-fury. Did it want to die? Certainly it did not want to fight! It had made itself entirely vulnerable to Orn's beak or talon, while its mate whispered behind.

Then everything fell into place. These huge, awkward, bumbling things—they didn't know *how* to fight. They could strike out with pieces of tree, but were unable to follow up any advantage gained. Both would soon become prey to a predator rep

unless they found sanctuary somewhere. So they had come to this isolated island, and, still afraid, had sought Orn's protection.

He would ordinarily have killed it anyway, or at least wounded it sufficiently to drive it off, this alien male. He was not hungry for the meat. But the very nest that made him stand his ground against an unremembered antagonist also made him disinclined to kill unnecessarily. His being was suffused with the juices of cohabitation and protectiveness; he had his own mate to comfort and eggs to warm, and bloodshed made a poor nesting mood.

The mam kept coming. Orn had either to kill him or let him pass, thereby extending his protection to the strange pair.

He heard Ornette pant with the first laying pangs.

Orn stood aside.

The female crossed then, and the two mams joined appendages and skirted the opposite shore of the peninsula. Orn stepped backward toward the nest, anxious to be with Ornette in her time of pain, but compelled to watch the mams lest they make some hostile move. He was profoundly uncertain, more so than he had been when he spared the ptera, but at least he had avoided battle and killing.

He came at last to the nest, and stood beside it for some time, listening to the mams while one wing touched Ornette's back. The creatures were behind the clustered pines, scraping the ground with their soft digits and uttering their ugly, drawn-out cries, but never coming toward him. They seemed to know that they lived on sufferance, and that the vicinity of the nest was forbidden. He would have to kill them if they came near Ornette or the eggs, particularly tonight.

Finally they settled down, and only their vocal noises persisted. That was their oddest trait: the perpetual and irrelevant sounds

they made in their throats and mouths.

"I wish there were some other solution." The female making tones of disturbance. "I hate to leave him alone like that."

"He's got a lot of knowhow." Now the male was replying with assurance. Their moods were not so different from those Orn shared with Ornette; only their vocalizing differed substantially. They employed drawn-out, modulated chains of sound in lieu of simple pitched honks. Apart from the clumsiness of the mode, it served. Everything about these ungainly mams was like that, however. Even their fur was matted and creased as though it had been baked in mud until it hung in chafing sheets. Nets of hair had fallen over their heads as well, obscuring their vision and smell perceptions and surely interfering with feeding.

"He'll know better than to try to go anywhere." The female was uttering modulations of self-reassurance now. "The mantas will protect him."

"Yeah."

One thing about their continuing utterances: it enabled Orn to keep track of them without leaving the nest or straining his perceptions. He settled down beside Ornette, who was relaxing for the moment, and listened.

"I wish we could get dry." Female. "I know it isn't really cold, but with this soaking and the sea-breeze—I'm shivering."

"I brought a tarp in my pack." Male. "Make a passable blanket, if that helps. It's watertight."

"You're thoughtful, Veg. But the wet clothing is right next to my skin, and the tarpaulin would prevent it from evaporating. I'll have to take my things off."

"I'll set up shop in the next gully."

"But you're cold too, Veg. You're just as

wet as I am, and there's only one tarpaulin."

"I've roughed it before, 'Quilon. Don't worry about me."

They were doing something. Orn heard the rustle of something he could not identify. Not leaves, not bark, not tangled fur. Concerned, he stood up quietly and moved to where he could oversee the mam camp.

The male was drawing flexible material from a rock-shaped object. It was as though a giant clamshell contained matted ferns. He spread it out, a single sheet, so that it settled over the female.

It was all right. They were merely spreading bedding.

"Veg—"

"'S okay. The tarp's dry. I had it sealed in. Got a dry T-shirt for you, too. Wrap it tight to keep the bugs out, though."

"Veg, you're not very bright sometimes."

"I know. I should've thought of dry clothing before diving in. In the morning I'll go back and pick up some. Now you fix yourself up, and I'll go down a ways and—"

"Veg, if we sleep apart we'll *both* be cold."

"I know, but no sense getting everything wet again with my sopping rags. You're better off by yourself."

Orn realized that they were disagreeing with each other in some awkward mam way. The female wanted something, but the male didn't understand.

"Veg, remember when I spoke about making a choice?"

"Yeah, 'Quilon. Back when we broke it up on Earth. I never forget things like that."

"I made it."

The mams were silent for a moment, but Orn, watching and listening and sniffing, was aware of a continuing tension between them. Some kind of understanding was incipient. He flexed his claws, ready to move if the creatures attempted to make a

night raid on the nest.

"Yeah, I'm not very bright." Male sound again: comprehension and triumph.

Then the male put his soft mam digits to his own fur and ripped it apart. It fell from his body in wet lumps, leaving him plucked. The female stood up and did the same. Orn was amazed; he could never have removed his own feathers like that, or have endured the pain.

The mams got down together and wrapped the big sheet around them, as though they were two hairless worms in a single cocoon.

Orn listened for a while longer. Then he realized the significance of their actions. *They were nesting!* What had passed before was their odd mam courtship, and now they were ready to copulate.

Relieved, he returned to his own nest. At last he understood the complete motive of this pair of intruders. They had sought a safe place to reside during their mating and confinement, and so had chosen to make common cause with his own family.

The big mams were not as stupid as he had supposed, merely strange.

That night, while the mams embraced clumsily and made sounds reflecting labors of universal significance, and while the three ptera hung in cold silence from their branches, Ornette gave birth to the final egg.

Peace and joy were upon the peninsula.

The mams woke in the morning but remained in their bundle for a time, waiting for the sun to strike away the chill. As the ptera began to stir, the mams unwound, attended to their special toilettes, and climbed back into their ugly fur. They ate from a cake of scorched, impacted plant stuff and drank copious quantities of water from a strange container. Like all mams, they imbibed and ejected an appalling

amount of liquid.

"Look at the pteranodons!" The female was making her excited noises again. Orn, initially irritated by this constant and useless chatter, was becoming used to it. He accepted every creature for what it was, and it seemed the giant mams were noisemakers.

Then a trach crossed the water from the mainland and sported about the peninsula, browsing for shore herbiage. This rep fed mainly on pine needles and cones, grinding them up with its flat bill full of little teeth. Though it was large, standing four times Orn's height and possessing a flat, sleek muscular tail, it was harmless unless provoked. It needed its full height to reach the succulent (to it) needles growing from the lower branches of the tall trees. It was related to the para Orn had first seen dead beyond the mountain range, but lacked the elaborate bonework on the head. A para could thus outrun a trach, because it ran cooler; but the trach was of sturdier construction.

Orn stood by the nest and let the rep graze as it would, leaving its webbed prints in the muck. That was why the island location was so good: most large reps that were able to reach it and climb on land were those that ate neither flesh nor eggs, and so were reasonably safe. Like this good-natured trach.

The mams also watched, but with greater caution. Their exclamations suggested that they were not accustomed to such proximity to the trach. Soon they relaxed, however, watching the rep's easy motions.

"I better check on Cal." And with that utterance the male was off, charging through the brush like a small tricer. The female remained to watch the trach play and feed.

Ornette rose from the nest, and Orn covered the three living eggs while she

exercised her legs and wings and cleaned herself off at the edge of the water. She had had a hard night, and was not entirely easy about the presence of the mams or the trach, but deferred to his judgment.

Orn watched the female mam speculatively. Most mams did not lay eggs, of course; they gave live birth, like the ichthy rep of the sea. After the authority of the mating ritual of the night just passed, this process was surely commencing within this female. Would the two mams remain on the island for the denouement? Perhaps the mam litter would grow up with Orn's own in compatible proximity. This would be a curious phenomenon, but not objectionable, so long as there was no strife between them concerning tasty grubs and such. His ancestors had nested upon occasion in harmony beside troos and even ankys, though the parent reps never went near their eggs once they had been deposited. Rep nests were far more transient than those of aves, so it didn't matter. But his species had never shared territory with struths or tyranns or crocs of any age; indeed, Orn would smash and consume any eggs he found of these creatures. It depended on the type of rep.

It depended on the type of mam, too. He would just have to be alert.

It was during this contemplative interlude that the first tremor struck.

Chapter 14: Cal

IT HURT HIM, this schism; he could not deny it. The group had come upon it almost incidentally, yet he had known it was brewing, and it had bothered him increasingly. They had been fortunate that it had not occurred on Nacre. Veg believed

in life, however naively; Cal believed in death. Aquilon fell between, vacillating, but tended toward life. This was not so simple a concept as good and evil; both qualities were represented on either side of this issue. It was primarily a question of what was necessary.

The four mantas understood that much, as they had demonstrated by their action at the orbiting station. Their view of man's endeavors was dispassionate, as was their view of the entire animal kingdom, since they were not of it. They remained with him because they knew that his approach to the problem of Paleo was realistic rather than emotional. Had it been otherwise—

He sighed. Had it been otherwise, he would have relegated all Earth to limbo, for the mere love of Aquilon. He acted as he had to, but this did not alter his love for her. Nor did her figurative elopement with Veg affect this; he was aware that the simmering chemistry of heterosexual existence had to boil over at some point. They loved life, and this was the essence of life; the fact that Cal had increasing yearnings of his own of that nature could not change his overall orientation. They were his friends, and he had more pressing responsibilities; he could not begrudge them their joy.

Meanwhile, he had a job to do. Paleo was suitable for colonization by Earth, and no report he could make could conceal that. In fact, it was vital that he make the matter entirely clear, though this would sacrifice this beautiful world, for there were larger concerns. If the rape of Paleo diverted mankind long enough to allow information to circulate to those who could and would be stimulated to ensure proper protection for the other worlds of the alternate framework—the positive backlash—the end did in this case justify the means. Whatever Aquilon might think. This would necessarily entail the retirement of certain native fauna,

and was certainly regrettable; but nature's way, properly guided, was best. No species could prevail by holding back. That was the way of self-extinction. The philosophy that saw virtue in the preservation of species and systems unfit to survive competitively—that philosophy was quaint but futile. Nature had no such sentiments.

Cal studied the raft in the morning light. He would have to arrange to sail it back across the bay by himself, then make the trek overland to Camp Two for supplies. Then a longer sea voyage back to their Paleocene camp, where the one remaining functional radio was. After that it would be merely a matter of waiting. Earth would decide.

It was not an easy journey he contemplated. Veg could have done it, but Cal was a far cry from that! Still, his philosophy accounted for this. He would make the attempt. If he failed, the report would not be made, and perhaps Veg and Aquilon would have their way. If he failed, he deserved to fail.

His strength was not great, but it was more than it had been. He could rig the sail, tie it in place, and handle the rudder provided the winds were moderate and favorable. He would have to be alert for large reptiles and stormy weather, assuming that either could be avoided. How he would navigate the barrier reefs he did not know; possibly he could map a channel through them at low tide, then follow that course at high tide. He judged that the odds were against his completing the trip, but with proper application and caution he hoped to make a worthy run for it.

"Ahoy!"

It was Veg hailing him from the island. Cal waved.

"How're you doing?" Veg called. Then, not waiting for an answer, the big man dived into the water and stroked for the raft.

"I'm going back to the Paleocene camp," Cal said as Veg clambered aboard. "The radio is there, and I believe the winds are shifting enough to make it feasible."

"Feasible, hell. You can't make it by yourself. Why don't you talk to 'Quilon again? We shouldn't split like this."

"Three, as the saying goes, is a crowd."

Veg covered up his embarrassment by going to the tied mound of supplies. Most of their equipment remained at Camp Two, but they had come prepared for several days. "She needs some dry clothing, okay?"

"She is welcome. Take some bread, too. She made it, after all. I'll be moving the Nacre out soon." There had not been any official division of spoils, but it was tacit: Veg had the woman, Cal the raft. And the mantas.

"You'll kill yourself."

Cal shrugged. "Death is no spectre to me."

"Here." Veg busied himself with the sail, hauling it into position and tying it securely. "If you get in trouble, send a manta."

They shook hands awkwardly and parted. Already the Nacre was tugging at the anchor.

The wind was fair and gentle, the sky overcast, and progress was satisfactory. The mantas sailed out over the water, stunning fish with their tails. Cal scooped them in with the net and piled them aboard the raft so that the mantas could feed at leisure.

It was interesting that the sea here was completely Paleocene. No ammonites, no rudists. Would Aquilon have dreamed about the rudist bivalve if he had described it to her as another typically Cretaceous sea creature? Only the reptiles had retained their hold on the sea, as part of the enclave. What did this signify about the relation of land and sea forms? There had to be some continuing link between the reptiles of land,

sea and air, so that they became extinct almost together . . .

The island was a mile astern when the tremor came. The water danced as though rain were hitting the surface, but there was no rain. The mantas, disgruntled, closed hastily on the raft and boarded. Debris sifted down from the trees visible along the shore, and dust came up in peripheral sections of the valley.

A tremor—no more than fifteen seconds in duration, not really severe. Cal did not react with unreasoning dread. Perhaps this little shake signified nothing—but it could be the prelude to a far more violent siege.

Veg and Aquilon were on the island, stranded there until they could construct a second raft. Certainly they would not attempt to swim to the mainland during the heat of the day; the carnivores of water and shore forbade it. But of course there was no security from an earthquake. They were as safe on the island as anywhere. Perhaps safer, when the great land predators, surely roused into anger by the shake, were taken into account.

He could return, but it would not resolve their interpersonal dilemma. The arguments had been made, the positions clarified. Best to continue as he had planned.

In the distance, in the strait between the islands Aquilon had dubbed Scylla and Charybdis, he made out animate activity. The water dwellers had indeed been shaken up by the tremor, and were rasting about, trying to flee or attack but finding no way to isolate the cause. Cal decided to steer well clear of them. Most were far smaller than Brachiosaurus, but many were more predacious, and even a herbivorous dinosaur was dangerous when alarmed. As the battered craft testified.

Tremendous pteranodons sailed in the sky, the only creatures unaffected. No—as

he watched, the winged reptiles changed course *en masse*. The wind had shifted, as though blunted by the tremor.

That meant trouble for him too. He had traveled under fair auspices so far, but any change in the wind would be the worse for him.

He untied the sail and began to haul it down. Now his lack of strength was critical, for what Veg made seem easy was a tremendous strain on his own resources. The sail, under tension, resisted his efforts.

Then the wind-shift caught up. The sail fluttered violently as it was struck almost at right angles, and the raft began turning. Cal knew how to adjust the sail and use the rudder so as to tack into the wind, but he also knew that he had neither the agility nor the strength to perform the coordinated tasks required. Sailing a clumsy raft was at best a two-man job, and tacking took muscle.

He did the next best thing. He steered the Nacre around forty-five degrees, heading northwest instead of west. This would bring him to land too soon, but seemed to be his safest course.

The mantas perched on the cabin roof, unable either to assist or to offer advice.

All too rapidly the Nacre came at the shore. This was the swampy region where certain tribes of duckbills foraged, but none were in evidence at the moment. Just as well. They were not inimical to man, but would have reacted unpredictably to a charging raft.

Now was the time to drop the sail, but the line was still jammed. The Nacre was driving relentlessly for the bank of land, carving a ragged course through the water plants.

The mantas dived for the sides. So did Cal.

He hit a cushion of soft plants and took in a mouthful of warm, slimy, but not salty

water before finding the mucky bottom with feet and hands. The depth here was about a yard.

The Nacre ploughed on, slowed by the thickening growths. Then the keel scraped into something more solid than the bottom mud, and the whole thing crunched to a halt, upright and listing only momentarily. The jammed rope let go, and the sail dropped resoundingly to the deck, releasing the raft from the urging of the wind.

Cal had taken his plunge for nothing.

He waded up and sought the crude anchor. This might not hold against a determined offshore wind, but again there was nothing better he could do. He would have to leave the Nacre and hope it remained secure for a day or two, until he could return. He was, at least, on the right side of the river.

He donned a small pack, taking only enough baked fish to last him a day, since he hoped to pick up supplies at Camp Two. He would be foolish to wear himself out prematurely, on this easiest leg of his journey.

As an afterthought, he took his quarterstaff too.

It was now early afternoon, and he knew he could not make the twenty miles the compass indicated before dark. He would have to husband his strength and do the job in stages. Time was not as critical as survival.

He trekked through the slough all afternoon, resting more frequently than he needed to. His strength was for the moment his most precious commodity, and he guarded it jealously. The mantas stayed with him though they would have been happier on their own; they were evidently concerned for his safety. By dusk he had achieved higher ground. He threw himself down, eyes closed, not bothering at first with any formal bedding.

Veg could have made this distance in an hour, he knew. But to Cal it was a victory, for a year ago he could not have made a tenth of it. He was tougher than he had been in a decade, and he took an unobjective pride in it.

But he still assessed his chances of success at less than even.

He ate a salted fish for breakfast and moved out. His legs were stiff, but he felt stronger than ever. This was the first time in many years he had traveled by himself, and he was pleased to discover how well it was going. He was making much better time on this firm terrain.

There were more deciduous, broad-leaved trees than he had supposed at first. Counting them idly, he found that fully a third of the substantial growths were familiar hardwoods—beech, birch, maple, ash, elm and so on. Though the typically Cretaceous flora predominated, the balance was even now shifting to these newer types. The land, like the ocean, was advancing relentlessly into the Cenozoic Era. Only the reptiles lingered.

By noon he was within five miles of the camp. The intricate distance-gauging compass assured him of that, since it had been keyed to Camp Two. He stopped to eat the last fish and sip water up from a small rain-formed pond, and the mantas ranged out to bring down their meals too. He was not worried about nourishment; the mantas would gladly kill for him if that became necessary, and show him the way to fresh water. He would spend the night in the leanto, then attempt to make the return trip in one more day. There would have to be many such journeys, of course, for he could not carry much at a time—but the exercise over a familiar trail should toughen him up for the major journey ahead. Perhaps he could fashion a harness-drag,

and transport a greater weight at one time. He felt better able to cope than ever before.

Hex came in, tail snapping. Trouble!

A predator dinosaur had come across his trail and was pursuing him. The mantas had tried to distract it harmlessly, but it was intent on one scent. This was what they had been alert against. A big one, Hex clarified: *Tyrannosaurus Rex*, king of the carnosaur.

The creature could be stopped, of course. The mantas could harrass it and probably blind it. Tyrannosaurus was far larger than the omnivore of Nacre, but no more dangerous to the swift manta. Four against one—

"Do not attack it," Cal said.

QUESTION. Hex didn't understand.

"This creature's world is on trial. If I get to the radio and send my report, my people will come and exterminate the biological system that now obtains. Not all at once, but over the years, the centuries, until the only dinosaurs remaining are caged in zoos, and the same for most of the primitive Paleocene fauna. Modern mammals will be introduced that will compete aggressively with the less sophisticated natives, and the trees will be cut for timber and pulp and the rocks mined for precious minerals. So Tyrannosaurus is fighting for his world, though he doesn't see it that way. If the reptile brings me down, the report will not be made, and man will not come here—at least, not quite so soon. If I escape the reptile, I will have vindicated my right, according to the implacable laws of nature, to supersede it on *Paleo*. It is a contest between us, and the prize is this world."

He had issued a statement whose entirety they could hardly be expected to grasp, but it seemed better not to confuse things by attempting to simplify a difficult concept. The mantas should understand that he did not want them to intercede on his behalf, and that he had reasons that were sufficient

for his own mind. That should be enough.

The other mantas came up, and an eye-to-eye dialogue followed. Would they acquiesce?

"Let me meet Tyrann alone," he repeated. "You watch, but do not interfere. Mammal against reptile, the chosen champions, one to one."

Hex snapped once. Yes, they accepted it. The mantas understood the rite of personal combat.

The four spread out to the sides and disappeared amid the cycads. Cal was on his own.

But not for long. A mile back, the giant was coming, crashing through the brush horrendously.

It had been easy to commit himself, for that was necessary by his definitions. It would not be as easy to survive the consequence of that decision. He was hardly the best representative of his species or class for such an encounter. But that was the way circumstance had offered, and he was ready to abide by nature's verdict. He had never been one to avoid confrontation with death.

Cal waited where he was. He wanted to face his opponent. It would be no good for him to sneak away, even if that should fool the reptile. He had to stand up to Tyrann, let the thing know he was challenging it. Then he could make his escape, if it was in him to accomplish it.

The ground shuddered, and not from any geologic tremor. Tyrannosaurus was closing in, unsbtly. Every step rocked the land, and the crashing of saplings became loud. This was the pinnacle of reptilian predatory development; no more massive carnivore had ever walked the earth.

The slender fern-trees swayed aside, as though reaching to the ginkgo for comfort. A terrified bird flew up. Through the palm-fronds poked a gaping set of jaws—fifteen feet above the ground. Then the whole of it

came into view: seemingly all teeth and legs, so tall that a man could pass upright under its thighs and tail without stooping. A roar like none ever to emanate from a mammalian throat shook the air, and the tiny cruel eyes peered down.

Tyrann had arrived.

Chapter 15: Aquilon

"**H**E'S SAILING the Nacre," Veg said as he reappeared. "Going back to the radio and send the message." He threw down the pack of supplies he had brought from the raft.

Aquilon was appalled. "He can't possibly do it by himself!"

He shrugged. "Can't stop him from trying." But his jaw was tight.

She knew the mantas represented a formidable bodyguard, but there were things they could not protect Cal from. Drowning, physical injury, heatstroke—

Still, Veg was right. If Cal insisted on attempting a suicidal journey, that was his concern. At least, so long as the break between them continued.

If only it were something other than the future of a world at stake! She would gladly have gone along with Cal for the sake of unity, on any lesser matter. But his report to Earth would damn Paleo by its praise, and she could not go along with that. It would violate all her most cherished, if uncertain, principles. The wolf should not be loosed at the lamb, not this way.

She felt guilt for either outcome: Cal's success or his failure. She knew he would not change his mind. If he lived, Paleo would die.

Now, too, she felt uneasy about her night of love with Veg. She had made her

choice—but she had done it because of the convenience of the moment, and that was not far clear of prostitution, in retrospect. And she suspected from Veg's silence on that score that he felt the same. They had wronged Cal, whatever the merit of their respective positions.

The Orn-birds went about their business, first one sitting on the nest, then the other, but usually the female. There were eggs, naturally; she had not glimpsed them, for the birds were sensitive about any human approach to the nest. But nothing else would account for such care.

The first day passed in beauty. She watched the Trachodon, the large duck-billed dinosaur, feeding among the pine trees. It was sleek in the water, with webbed feet and a tail flattened like that of a crocodile. When it stood on land it was fifteen feet tall, resembling an outsize kangaroo, and the hind feet were revealed as possessing tripartite hoofs. *Duckbilled*—but not *ducklike*!

Trachodon spent most of its time chewing, as though its digestion not only began in the mouth but ended there. Its hide was pebbled, without scales or other armor, and the play of the creature's musculature was quite clear underneath the skin. Its underside was whitish, reminding her of a snake. Its sheer size fazed her at first, but Trach was really quite likable when familiar. It almost seemed to pose for her, remaining impossibly still except for its jaws, and she painted many portraits. She was sorry to see Trach go, once its belly was full of pine.

At night the Pteranodons returned to their bough to sleep, and that was another impressive spectacle. She had somehow imagined all dinosaurs to be ravening monsters or dim-witted behemoths, before coming to Paleo; this day on the island, watching Trachodon and Pteranodon in life,

banished that prejudice forever. These reptiles had individual personalities and problems, and were bright enough about the latter.

She also saw, that first day, the raft sailing before the wind, angling in toward the mainland, and finally anchoring there. She knew why: the wind had shifted after the tremor, and Cal had been unable to sail directly back to Camp One. At least he had made it safely to shore.

The second night she and Veg slept under the tarpaulin but did not make love.

Two nights and a day on an isle very like paradise—but the tension was cruel. What was Cal doing? He was so small, so weak; he could be lying exhausted in the swamp . . .

No. The mantas would come back and report. He must be all right.

Still—

"One's coming!" Veg called, looking up from the new raft he was building.

She ran to his side to see. A lone manta was speeding across the water toward the island. *Circe!*

The story did not take long: a Tyrannosaur was after Cal. He had forbidden the mantas to help. *Circe* departed.

"The crazy fool!" Veg cried. "He's suiciding again!"

But it was not that simple. Cal *wanted* to fight the dinosaur, according to *Circe*. Ritual combat.

"I know how he thinks!" Veg said. "He wants to prove he can do it by himself. And he can't."

"You mean, prove he's better physically than a dinosaur? That doesn't sound like the kind of thing—"

"That he can get through and send his message, no matter what. Our leaving him didn't stop him, Tyrann won't stop him. That makes it right, he figures."

Suddenly she saw it. The mammals

against the reptiles, each represented by its most advanced stage, one individual meeting the other on the field of honor. The decisive combat. The carnosaur had size and power; the man had brain. It was a fair compromise, a way to settle an otherwise insoluble dilemma. If Cal won, he would send his message and be justified in the spoils; if he lost—well, it was an answer, and he had chosen the way to come by it.

"I'm going over there," Veg said.

"Veg—"

"I'll have to swim to the mainland and run along the shore. Cross the river up where it's narrower, nearer Camp Two. Hope I can pick up his trail, or maybe a manta'll show me. Fastest way. Might make it in time to haul him out of there alive." He was fastening his clothing for swimming as he spoke.

"Veg, I think we should let him do it his way. On his own. That's the way he wants it."

"He'll get killed!"

She hesitated. "Maybe—that's best."

Veg stiffened. Then, so suddenly that she did not realize what had happened at first, he hit her. His arm came back in a hard swing that caught her across the side of the head and sent her reeling to the ground.

By the time she righted herself, he was in the water, well on his way. She must have blacked out momentarily, for she had not seen him go.

Her hand lifted to touch the stinging, swelling side of her face gingerly. His wrist had struck against her cheekbone; there was no blood. Veg had not even paused to see whether she was hurt. Thus eloquently had she been advised of his first loyalty.

Had she worried about coming between these men? She should have known there was no danger of that!

Yet it still seemed to her that Cal was not only courageous, but right. She could abide

by the decision, made that way. Veg, long as he had known Cal, loyal as he was, did not understand. Nothing would be settled if he got there "in time."

She turned to find Orn—yes, that was the name that fit—standing behind her. He was close and quite formidable, suddenly, with myriad tiny scars showing on his legs and beak, and some feathers not completely grown out to replace lost ones. He could have struck her down easily while she stood bemused, but she sensed no hostility in him.

Hesitantly she reached toward him, experiencing an overwhelming need for companionship of any type. She was alone now, on a strange world, without any genuine hope of seeing either man again. Cal's mission was suicidal—but so was Veg's. It might be that the only company she would know henceforth would be that of the big birds.

Orn opened his mighty beak and caught her hand within it—and did not bite. She felt the knife-edges of his jaw and knew that her fingers could be severed cleanly by its vicelike compression. But the touch was token.

Then Orn dropped her hand and returned to his nest. It was as though he had touched her in comfort, but not remained to make an issue of it. She was deeply grateful for the gesture.

She roused herself after a time and foraged for edible roots on the main body of the island, since her supplies would not last indefinitely. Her heart was not in it, but she did have to eat. She found a lone banana plant, but the fruit was not ripe. It was afternoon, and she knew nothing of the progress of the two men. She might have expected Circe to stay with her, but the manta was away on some other business. The rapport she had thought she had with the creature of Nacre was fading.

A second tremor came—a stronger one.

The ground did not shudder, it rocked. It was as though the soil had turned liquid, and she was riding the waves. She kept her feet with difficulty.

She had a sudden and ugly premonition what such a quake would do to a nest built on a rock, and to the fragile eggs within that nest. She ran swiftly back to the peninsula as the motion of the ground subsided.

The site of the nest was chaotic. Both birds were standing beside the rock, fluttering their vestigial wings. The worst had happened!

They did not challenge her as she approached, too upset, she realized, to maintain their guard. The nest was damaged but largely intact. The eggs—

Fragments of thick shell projected up, and white and yellow jelly filled the base of the main cavity. The eggs had been shattered by the quake. The birds seemed stunned by the calamity. She visualized the mutilated corpses of human babies in place of the smashed eggs, and thought she understood how the Orns felt.

But one shell appeared to be intact. Aquilon touched it hesitantly with a finger and found it warm and firm. It was eight or nine inches' long and slender in proportion, the surface rough. She reached both hands around it and lifted the object out, careful not to let it slip in the slick fluid around it.

Both birds were still, watching her helplessly. "This one's all right," she said.

From somewhere in their throats came an incredulous, hope-dawning cooing.

She carried the egg to a dry hollow and set it down. "Keep it warm," she said. "You can make another nest." She backed away.

After a moment the female—Aquilon thought of her as Ornette—came over and studied it. Then, in a kind of nervous collapse, she sat on it.

But one crisis had passed only to lead to another. The odor of the broken eggs had

attracted a predator. Sleek and very long in the water it came—a giant crocodilian reptile, not closely related to the modern crocodiles of Earth but similar externally and every bit as dangerous. Twenty feet from snout to tail, it hauled itself out of the water at the rocky mouth of the inlet and scrambled overland toward the nest.

Orn charged it, squawking loudly and beating the air with his wings, but the armored reptile only snapped sidelong at him and continued without pause. Nothing Orn's size could hurt it seriously; that was obvious.

Would it stop with the nest? Aquilon knew it would not. It must have swum over from the main swamp, for she had seen nothing like this near the island before. The duckbill would hardly have been so casual, either, had it sniffed this predator. Perhaps the quake had jolted it from its accustomed beat. It was hardly in a mood to be reasonable by any mammalian or avian definition. Now that it was here, it would pursue all food available—and that meant the third egg, and the bird protecting it, and probably the stranded bipedal mammal, herself, as well.

Aquilon fetched her quarterstaff. She held it by one end and ran at the crocodilian as though she carried a lance. The forward end struck the creature's leather-tough neck and bounced off, denting it only slightly but delivering a severe jar to her.

The long head swung about, jaws gaping. Aquilon braced herself and swung the pole like a club, striking that snout resoundingly. Unhurt but annoyed, the reptile charged her, its horrendous teeth leading.

Fighting instinctively, she drove the quarterstaff lengthwise into its mouth. To her horror, the entire pole disappeared into that orifice, and the snapping jaws barely missed her hands. She scrambled back.

But it was enough. The crocodilian

coughed and shook its head, pained by the object in its throat. Unable for the moment either to swallow it or spit it out, the monster abruptly plunged into the water. It swam to the rocky inlet mouth, jammed itself between the stones so violently that it left scrapings of flesh, and departed. As it passed from view, she heard its teeth clashing together as it sought vainly to bite down on the obstruction anchored neatly between the dental rows.

Aquilon sat down hard, discovering herself panting desperately. She had expended more energy than she realized during the excitement, and was nearly exhausted. But she had won! Her omnivore heritage had come to her rescue and she had driven off the predator.

At the cost of the only weapon she had. Well, she could make another.

Was this the type of creature she was striving to protect from Earth's ravages? A twenty-foot, merciless egg-eating carnivore?

With this in the water, and others like it—had Veg even made it to the shore?

Dusk was coming—where had the day vanished!—and with it the Pteranodons. Aquilon got up, still too tense to eat, and began to walk to the tarpaulin on the other side of the peninsula.

Orn blocked her way. She stared at him blankly, then tried to step around. He blocked her again, herding her back by spreading his wings. They were larger than she had thought; their total span, tip to tip, was about five feet. Far too small to enable him ever to fly, but handsome in their own right. The under surfaces seemed almost to glow. Some of the feathers had been freshly broken off, courtesy of the crocodilian. But Orn's manner was not threatening.

She turned and walked toward the makeshift nest, now buttressed by bits of moss Ornette had found within reach. Orn

followed. She got to her hands and knees beside Ornette, then curled up and lay beside the huge bird. Orn settled down at her exposed side, spreading one wing to partially cover her body. It was like a thick, warm blanket—and yes, it made her feel immeasurably safer.

No—*this* was what she was fighting to save! This unique, intelligent family, related to her only in spirit.

Comfortable and secure between the two great warm bodies, she slept.

Chapter 16: Cal

IT WAS MIND against matter. The mind of man against the matter of reptile. One would prove itself superior in this contest, and to that one would go this world. That was the way it had to be. Except for one small factor—

Tyrannosaurus Rex—the tyrant lizard king—charged down on him, banishing that speculation. Yet in this moment of confrontation he had an aberrant vision of Aquilon, so lovely she blinded even his mind's eye. She would have understood this, had she known of it, and perhaps she also would have approved. Had he known this opportunity would arise, he could have arranged to avoid the schism in the human party.

But Veg would not have gone along. The big man tended to overlook the nuances of interspecies morality, and so relied on conformance to a simplistic code. THOU SHALT NOT KILL—except when threatened. And who could say what constituted a legitimate threat? The corollary was taken as Thou Shalt Not Eat the Flesh of Any Member of the Animal Kingdom—forgetting that man was a

natural predator, owing much of his progress to his diet. So how could such a code solve or even ameliorate the myriad problems of the species? No matter; conform.

All this, in fragments, while Tyrann crashed toward him, head swaying from side to side for balance, eyes fixed on target. The reptile was now within a hundred feet: twice its own body length, five times its height. It was moving forward in a roughly straight line at some twenty miles per hour, ten tons of malevolence. Perhaps it was disappointed in the size of its quarry, hardly worth the effort—but this did not slow it.

No, Veg would not have understood. So it had to be this way: a battle without witnesses, except for the alien mantas. If he lost, his friends would assume he had been suicidally foolish. If he won, lucky. But *he* knew, and that was what counted.

Time to stop reminiscing and start competing.

Cal waited until Tyrann was within a single body length, calculating the time factor. Fifty feet at twenty miles an hour would be about a second and a half until contact—too brief for fine adjustments on its part. The maneuverative advantage did not lie with size. At that critical point—fifty feet—Cal dodged to the side.

His velocity from a standing start was slower than that continuing motion of the dinosaur, but he had a smaller distance to go. He covered only fifteen feet before the six-inch teeth clashed where he had been, and another ten by the time the tremendous thigh and foot rocked the ground behind him. But the margin had been sufficient.

Tyrann, discommoded by the miss, drove his nose into the dirt and came to a roaring halt. He lifted his mottled head, dewlap stretching, small eyes peering balefully about while leaves and twigs tumbled wetly from his jaws. It took him a moment to



realize what had happened, but not a long moment. He was a predator, and few of that ilk were stupid or slow when hungry. He had been fooled once by a seemingly petrified morsel, but now he knew it for one of the quick-footed mammals, and he would not underestimate its agility again.

Cal, meanwhile, had made it to the nearest large palm tree, holding his quarterstaff aloft. He had won the first pass by utilizing his advantage of mobility. His shorter neural chains permitted faster responses; the distance from his brain to his feet was a fraction of the corresponding connection in the dinosaur. But the overall advantage remained with Tyrann, who could outrun him on the straightway and catch him when the dodging slowed.

Of course even that was not clear-cut. Tyrann had a great deal more mass to sling about, and a sprint would wear him out rapidly and overheat his tissues. Cal could probably outrun him in the long run, if he survived the short run.

The reptile sniffed the air and oriented on Cal's tree. There, too, was a weapon: the predator's well-developed nose. There was room in that huge head for capacious nasal chambers, and though the gleaming teeth were superficially impressive, they were dependent on the functioning of that nose. The eyes and ears were less important, since Tyrann was not a sneaker. He required one sure way to locate his prey, and the nose was it.

Fortunately for Cal, the sense of smell was ineffective as a guide to the whereabouts of a fast-maneuvering creature. Cal could not hope to hide long or steal away any great distance, but right now he could force the *carnosaur* to use his less effective senses. That was the function of his brain: to divert the contest to his opponent's weaknesses, his own strengths, and thus prevail.

Maybe.

Tyrann charged the tree. It seemed ludicrous to imagine weakness in connection with twenty thousand pounds of predator, or of strength in his own hundred pounds. But—that was the thesis he intended to prove.

Tyrann knew about trees. He did not bite the palm or crash into it. His forelimbs, smaller than his own great toes, were useless; they were hardly more than toothpicks projecting from the neck. Literally: Tyrann cleaned his teeth with those vestigial, two-clawed arms, though even that made him contort his neck to make the connection. So it seemed that he could not get at Cal, so long as the man kept the broad trunk between them.

Not at all. The dinosaur turned and swept his massive tail against the trunk. The tree vibrated; loose fronds dropped, forcing Cal to cower. A spearlike dry seed-pod plunged into the ground next to his head: the thing was a yard long and well-pointed. He jumped away from the tree, realizing how hazardous its cover was—but stopped, realizing that that was what Tyrann intended.

The tail itself whipped around, a scarred column of flesh, and caught him smartly on the hip as he was trying to get back to the palm. Its force had been broken by the trunk, and its vertebrae did not permit much flexibility, but the residual nudge was enough to send him lurching away from his cover again. His quarterstaff was jolted wide, and he had no chance to recover it. Now he lacked even token armament.

And of course Tyrann was ready. He pounced.

Cal ducked under the dinosaur, avoiding the gaping jaws again by the surprise of his motion. Tyrann had anticipated flight away from him, and had compensated accordingly. Cal bounced off the hanging

skin of the reptile's neck, scraping his arm against the horny creases, and jumped for the tree again, panting.

He was thankful he hadn't tried to escape by climbing the palm. He would have been an easy target for that tail. Tyrann could not use it to reach or clutch or coil, but that brute banging against the base of the tree would have shaken almost anything loose.

Tyrann swung around again, watching Cal with one eye. The tail lifted, swung.

Cal didn't wait for it this time. He sprinted away from the trunk, eyes open. As the tail struck and whipped over, he threw himself down flat and let the tip pass over him. Immediately he was up again and running for the next tree, legs and lungs straining.

Tyrann let forth a bellow that sounded like gravel being dumped on a metal roof. He followed. Cal didn't stop at the tree; he passed it and angled for a small forest of firs he saw a few hundred feet ahead. His breath rasped in his throat, saliva streamed back across his cheek, and a pain in his side blossomed into a square foot of agony, but he could not stop.

The dinosaur was impeded by the trees, since he had to circle them with wider clearance, but still was making better speed. His two feet came down like pile drivers, shaking the earth with an oddly measured beat.

Cal's heart was pumping harshly, and now his entire chest was aflame. He saw that he could not make it to the pines, the spruce. Tyrann should be getting winded himself by this time—but it seemed that the dinosaur's strides were so long that this pace represented walking, not running, and so was not tiring. Cal dived behind a leaning oak and propped himself against it, too fatigued to do more than watch Tyrann.

But here he had a fortunate break. The small-brained reptile had forgotten his

quarry's predilection for changing direction, and charged on by the tree. Then, realizing the error, Tyrann cast about, but could not immediately recover contact. The smell of the mammal was stronger behind than ahead, and that did not make immediate sense to the reptile.

Cal slid around the tree, aware that the accidental respite had probably saved his life. But he knew very well that the war was not over; this was only an intermission, and a momentary one.

Tyrann got his bearings and approached the tree. This time he waited to see which way Cal would bolt, not aware that the man had scant energy left to move at all. Yes, the dinosaur learned by experience—but not quickly enough, in this case. He lunged ahead when caution was best, and practiced caution when the direct approach would nab the prize. But that was his handicap: he was bright enough for a reptile, but hardly in the intellectual league with a man.

The truth was that Tyrann would be better off giving up on Cal and looking for some careless upland-dwelling baby *Brachiosaurus*; those young did not reside in the water until their developing mass required it, and by then their numbers had been thinned to the verge of extinction. The adult female *Brachs* made annual pilgrimages upland to lay their eggs, and they too would be easy harvest for Tyrann. But this dinosaur had determination; he had settled on Cal as prey for the day, and would not give up. Cal respected that; this was a worthy opponent, over whom a victory would be meaningful.

By the time Tyrann decided that the prey was not going to move, Cal had recovered the better part of his wind, and the pain in his bowels had abated. Oddly, he felt stronger than ever, as though tempered, as though his exertions had been pouring energy into him rather than drawing it out. This was

possible: his weakness had been a symptom of an Earth-nurtured psychological syndrome, rather than anything initially physical. At Nacre he had tasted his first hint of freedom from it, aboard that sparsely populated world and with staunch companions. On Paleo he had his second experience—and though there were elements of disharmony, the overall effect was beneficial. And by this very chase he was resolving the last of that internal conflict. The long agony of indecision was over; he would prove himself—and his species, and his genus, family, order and class—or die. He did not need to cripple himself any longer.

So now, perhaps, the bodily resources that had been so long suppressed were reappearing, and he was ready for the dinosaur. It was a good feeling.

Tyrann lunged at the tree, but this time did not swing about to threaten with his tail. He put his head beyond the slanted trunk and stopped.

Cal scooted a quarter of the way around, but halted when he saw that his opponent was there too. One giant leg came down beside the tree, while the nightmarish head descended from the opposite side. Tyrann *could* close the circle, when he happened across the right technique!

But with difficulty. This was an unusual maneuver, and the dinosaur's reflexes were geared more for crashing through than for curling around. The closure occurred slowly, and the tail could not make it at all. The highly flexible neck was the principle instrument, coming to meet the tremendous thigh—Cal between.

Saliva dripped from the grinning mouth, spilling over the double-edged teeth. The stench of reptile was oppressive. Cal peered into the near eye, just a yard away and huge from this vantage. The lower jaw widened just below it, making anchorage for bulging

facial muscles. The skin was rough, covered irregularly with tubercles, puckered in the region of the ear-hole, and hung below the chin in a kind of extended wattle: the dewlap. Oh for the lost quarterstaff now! He could have used it to poke out that eye!

He glanced down, seeking some weapon, but there was only loam and acorns. A handful of course gravel hurled into that eye might start the job; but *acorns*?

Slowly the jaws parted, the lipless skin peeling back from every dagger-jagged tooth, and sliding across the muscle-filled fenestrae, the windows in the skull. The alien reptilian breath blasted out, hot, not cold. It was a misnomer to describe reptiles as cold-blooded; their body temperatures were variable, determined by external conditions and exertion. In this warm valley, the reptile ran about as hot as the mammal and functioned about as well.

The stunted forelimbs turned out to be as large as Cal's own arms, their claws long and sharp. Useful for holding the slowly-dying meat firmly against the mouth, certainly: much as a busy executive might hold the telephone receiver against his ear by hunching his shoulder, aided by a little harness. Hardly essential, but useful upon occasion.

One tooth was broken, leaving a gap, and the gum there was black. Tyrann's temper could hardly have been improved by that recent accident. But already the replacement tooth was pushing up.

This was a strange situation: he was about to be bitten in half, slow-motion! If he ran for it, Tyrann would catch him; he could see the tension on the ponderous leg muscles, ready for that forward thrust around the tree. But if he remained—

Closer. Tyrann's nostril, inconspicuous from a distance, now seemed large enough for Cal to put his fist into. But the eye, though within reach, was guarded by a

heavy overhanging ridge of bone and skin; he was sure that if he struck at it the eye would blink shut, and he would smash his hand against that protection painfully. The ear indentation did not even penetrate the head; skin covered the canal just inside the depression. Yes, the dinosaur was well protected.

Still, Tyrann could hear well enough. Cal leaned toward the head until only inches separated his face from the skin of the monster. The rank odor made him want to gag, and he could see body parasites in the folds.

"Boo!" he yelled.

The dinosaur jumped.

Cal was off and away, sprinting again for the corpse of assorted firs. Tyrann recovered in a moment, merely startled by the unexpected noise, but too late. A jump reaction, in a creature of that size, was a matter of seconds from start to finish. The prey had won another round.

The firs were not large, but were close together and thickly spoked. The proximity of the trees served to break off useless lower limbs—but many of the stubs were jammed into neighboring trunks, forming rungs. Cal scraped himself getting through them, but was grateful for their protection. Tyrann had to crash through headlong, and that was noisy, painful and time-consuming. Cal was able to catch his breath again as he showed to a walk-and-scramble, threading past the worst of the maze.

But it was another brief respite. Tyrann could knock aside those slender trees and bulldoze them down, and was doing so. The stand was not as extensive as Cal had hoped; a few minutes would see little besides cordwood here. And the dinosaur, stung by repeated jabs of fir-spokes, was beginning to grow perturbed.

Beyond this was palm-dotted prairie. That was sure victory for Tyrann.

Except—there was a herd of Triceratops in sight, lazing in the shadow of the trees and browsing on the fronds. If he were able to play one species off against the other—

Cal ran out toward the herd. A bull winded him and looked up, a morsel of palm-stalk projecting from his tremendous beak. Then the Tricer spotted the carnosaur behind. Why the herd hadn't noticed the intrusion before, Cal could not say. Perhaps they had been aware of Tyrann right along, but had known he was after other prey and therefore no immediate threat to the herd. That, combined with the discomfort of having to walk through the sun to find other shade must have kept them where they were. It was a complacency that armored brutes of this magnitude could afford—but no lesser creatures!

By running at the herd, however, Cal was luring Tyrann too close. The bull gave out an oddly regressive hiss, and suddenly there was motion elsewhere. The adult Tricers bullied their young into a confined area adjacent to the trunk of the largest palm, then turned about and formed a ring outside, just at the fringe of the shade, armored heads pointing out. It was a formidable phalanx, executed with military dispatch.

Cal was daunted himself. These were tremendous animals, and dangerous. Those beaks, intended for slicing through palm wood, could as readily amputate his limbs; and as for the horns . . . ! But he had no choice. Tyrann was closing the gap again, and there was no other cover. He ran at the defensive circle of behemoths.

The nearest bull didn't like it. He hissed his challenge again and charged out of the pack. Sunlight glinted from his polished horns. The adjacent bulls rocked over to fill the gap, keeping the circle tight.

Cal, perforce, brought up short. No living animal ever resembled a tank more than

Triceratops. Then he used the trick applied earlier to Tyrann, and jumped to the side.

Almost eight tons of armored flesh thudded by. The Tricer was not as large as Tyrann, but was more solidly built. Its body, exclusive of the tail, was twenty feet long, the head taking up about a third of it. Two devastating horns jutted above the eyes and a third, shorter but thicker, perched on the broad beak. Behind the head was a tremendous bony shield large enough for a man to ride on. The astonishing jaw muscles anchored to this, making even Tyrann's face seem flabby in comparison. There was more bone and muscle on Tricer's head than in the entire body of most other creatures. The skin of the rest of the torso, though technically unarmored, was ribbed like the hide of a crocodile, and Cal was sure it was just as tough.

Now Tricer confronted Tyrann—a situation neither had sought. Tyrann tried to skirt around the bull to get at Cal, but Tricer would not permit an approach near the herd. To it, the small mammal was an annoyance—but the carnosaur was a threat.

And so they came to unwilling battle, these two giants of the age of reptiles. The one would not relinquish his chase; the other would not permit passage.

Tyrann, goaded to fury by the unreasonable interference of the bull, roared and gestured: an impressive spectacle. Tricer merely waited, the three fierce horns focussed on the enemy. Tyrann skittered to the side, seeking a vulnerable point beyond horn and shield. Tricer whirled with surprising finesse, the neck muscles flexing hugely, and gored him in the thigh.

Tyrann screamed and bit at the briefly exposed rump. The teeth sank in, but Tricer whirled again, the three horns swinging about like the machinegun turret of the tank he resembled, and the hold was broken. Cal

observed that the broad bony shield did double duty: the neck musculature also anchored to it. Just as a flying bird needed a strong keelbone to brace the flying muscles, so Tricer needed that shield to whip his massive head about. What an engine of defense!

Blood speckled each combatant, but inhibited neither. Tyrann did not take lightly to being balked, but Tricer would not give way.

Then a second bull came out, and Tyrann backed off hastily. Two trios of horns could destroy him. But this one was after Cal, and the man had to flee even more precipitously. Apparently the herbivores had decided that he was too much trouble to entertain. Or they had realized that Tyrann would not leave until the mammal did.

The two bulls were between Cal and Tyrann, each herding its object before it. Cal was amenable; this allowed him to increase his distance from the carnosaur. He spied an inlet of water and headed for it, congratulating himself for a winning tactic.

Tyrann finally freed himself from the harrassment of the bulls and charged in Cal's direction. Cal threw himself down a short steep bank and into the bay.

It was shallow. He had succeeded in covering himself with muck, but knew that two feet of water would hardly balk Tyrann for long. The carnosaur probably chased after water reptiles to depths of ten feet or so. He had made a tactical error.

Tyrann splashed down, sending muck flying. And sank in to his tall knees. Instead of firm bottom, it was ooze-bottom, and the dinosaur's much greater weight put him as deep, proportionately, as the much smaller man. They were even. Cal chided himself for not realizing that beforehand. So far, he had prevailed more by chance than by application of brain, and that was not as it should be, if he were to prove anything.

Again in grotesque slow-motion, man and reptile staggered through the swamp. But again the pursuer was gaining. Cal had supposed that Tyrann was basically a hide-and-pounce hunter, or a take-from-other-hunter bully: neither occupation requiring much stamina. But this chase had passed beyond that stage.

Cal looked for deeper water, hoping to lure Tyrann out beyond his safe depth. He was sure the dinosaur could not swim. Both of them would risk attack by swimming predators, but Tyrann would be the prime target there.

This, however, turned out to be a slender ribbon of swamp, extending like a tongue into higher ground. Deep water was too far away. He would have to slough along for a mile or more, and that was out of the question.

He heard Tyrann panting behind him. At least this was taking as much out of the carnosaur as the man. The creature had a lot more mass to haul around, and his energy requirements right now must be phenomenal.

Cal angled to the far bank and scrambled up. He gained distance as he hit the firmer footing. With another belated inspiration he ran along the bank instead of away from the water, tempting the dinosaur to chase directly after him. Tyrann did not understand about vectors; to him the direct route was the fastest and surest, whatever the terrain. So he waded after Cal rather than cutting to the bank and gaining high ground first. Cal's lead increased dramatically.

Tyrann was almost out of sight behind when the terrain shifted to favor him again. Nature played no favorites! Cal had been running downhill, toward the main swamp, and the land was becoming generally lower and flatter. Soon he would have no firm footing remaining, and would have to wade

or swim again. That might get him away from Tyrann—but without that close pursuit, there would be nothing to distract the attention of the water predators from him. They were as dangerous in their medium as Tyrann was on his—and Cal's contest was with *this* reptile, not some aquatic monster. If he had to be eaten, it was only proper that Tyrann be allowed the honors. He had already earned this meal!

Cal reversed his field and ran headlong the way he had come, ducking down to avoid Tyrann's sight. It worked; the dinosaur continued sloshing downstream. By the time Tyrann realized what had happened, Cal had a lead of half a mile.

He needed it, in order to cross the plain and achieve new cover. Tyrann came into sight again, making excellent time, probably spurred by increasing appetite. Nothing like a walk before dinner! But the reptile's persistence was amazing. The chase had lasted a couple of hours now, and was far from over.

Yet this, of course, was the way Tyrann obtained his meals. He was not a swift runner compared to *Struthiomimus*, the "ostrich dinosaur," or an agile hunter compared to even primitive mammalian carnivores. He was limited largely to land, which meant that he seldom dined on *Brachiosaurus* in quantity. The young *Brachs* were of course available—but swift and small, and the fleet amphibious duckbills were similarly elusive. Stealth was not, as it turned out, Tyrann's way, nor was he particularly clever. Probably he dined on carrion as often as not, sniffing out the rotting carcasses of creatures who had perished by other means, then driving off other predators. But this would be an uncertain living at best, and live meat was a treat worth striving for.

No—*Tyrannosaurus* succeeded largely by determination. Once he fixed on his prey,

living or dead, he never relented. Other things might intersperse themselves, such as the fir grove, Triceratops herd and swamp channel, but Tyrann would keep after his original objective until he ran it down. That way his meal was certain, eventually. And his meager intellect was not strained, and his energies not wastefully dissipated in fruitless asides. Even the fleetest prey must succumb in time.

It had become a contest of endurance. Though the carnosaur was wounded—Cal could see the blood along the thigh where the bull had gored—he still had substantial physical resources. But the prey, in this case, had equivalent *mental* resources. Which would prevail—muscle or mind?

Cal headed uphill. Right now he'd be happy to trade a few points IQ for a few pounds of striated tissue in the legs and torso. The vagaries of the chase had caused him to bypass Camp Two, and he was ascending the mountain face beyond it. The climate was changing rapidly, both because of the waning of the day and increasing elevation. This had to shift the balance somewhat in his favor, because he was a controlled-temperature creature while Tyrann was not. He could function efficiently regardless of the external temperature, theoretically. A reptile in the cold was a reptile helpless.

Yet Tyrann continued to close the gap, and once more was within a hundred feet. Now Cal had to dodge around trees and rocks, lest he be overrun. Damn that giant stride of the dinosaur! This should have been superior terrain for the mammal, with its myriad crevices, but none were secure for any extended stay. He had to keep moving.

He was tired. He was in excellent condition, considering his past history, but a pressing chase of several hours was more than his body had been geared for. Tyrann, on the other hand, seemed to have most of

his original vigor about him. Endurance: yes. Or merely pacing.

Cal fell. At first he thought that fatigue had brought him low; then he realized that the mountain had thrown him down. The earth was rocking violently, and Tyrann was screaming with cantankerous surprise. It was an earthquake—far more severe than the tremor he had observed while on the raft yesterday.

Cal was small, light and lucky. Tyrann was none of these. The dinosaur was upended and rolled several hundred feet downhill, to crash into the brush. Nature had played favorites this time.

Cal needed the reprieve, but he resented it. He wanted to win by his own abilities, nothing else. He sat down after the earth was still and waited for Tyrann to resume the chase.

The dinosaur was slow in doing so. A roughing of that nature was hard on him, because of his size. A mouse might fall a hundred feet straight down and survive nicely; an elephant might fall its own height and be killed on the spot, because of the problems its magnified mass brought. Tyrann had merely rolled—but that probably represented the most brutal punishment he had ever had. Internal organs could have been ruptured, bones splintered . . .

But no. Tyrann got up and resumed his ascent—but with only a fraction of his previous vigor. Now Cal could stay ahead without panting.

So it continued, slower. The air became cool and more than cool, as dusk and height came together. Even through his exertions, Cal felt it; his clothing had dried on his body and was fairly good insulation, but still he was not dressed for freezing weather. Yet Tyrann continued, bruised and scarred and shaken in more than the thigh, but seemingly unaffected by the temperature.

Of course! The dinosaur had considerable mass, and so was slow to cool. And his giant muscles would generate a large amount of heat, keeping him going longer. Tyrann could probably keep up the chase as long as Cal could, even into the snows of the upper mountain.

Unless Cal could trick him into remaining stationary for a few hours . . .

Meanwhile, he would have to drop down into the warmer region. He was quite tired now, and the buoyancy of the chase was giving out. If he rested in hiding, the cold would get him. And he couldn't hide anyway, even in the dark, because Tyrann would locate him by smell.

Yes, it was brains against brawn—but in what manner could brains mitigate the cold? If only he had warm clothing! Then he could ascend into the very snows, while the dinosaur slowly capitulated to nature. The mammalian form was superior; a hairy animal could have lost Tyrann easily here, or even turned and challenged him. A woolly elephant—

Cal stumbled, pushing himself up with difficulty. Why dream? It was his own body he had to make do with, and his own brain he meant to apply. Tyrann was still hardly more than fifty feet behind, but Cal had become used to that distance. They both knew that the chase had come down to its essential: the first to give way to exposure and exhaustion would forfeit the game. The sudden charges and matching dodges were over, as were the peek-a-boo games around trees. The rules were set, and the mammal could afford to stumble so long as he got up promptly.

Still he hesitated—and Tyrann hesitated also, as though waiting for him to proceed. They had become accustomed to each other, the tiny man and the giant reptile. They had been over much territory together, shared many experiences—even

an earthquake. There was a camaraderie of a sort in experience and fatigue.

But he knew the dinosaur would gobble him up when that phase ended. Camaraderie did not presume amity. It was merely a kind of appreciation in adversity. He hesitated not from any sense of safety, but because something was trying to impress itself on his cold-dulled sensitivities. Something—warm.

Warm. The ground was wet and the wetness was soaking through his footwear and in that moisture was heat, as though he had stepped in the drain chute of an outdoor bathtub. But the temperature of the air was near the freezing point of water. What was this—a hallucination brought about by his deteriorating condition? Was he about to imagine himself falling into a lush warm paradise, a tropical garden near the snowline where rapture abounded . . . while in reality his feet froze and the jaws of the carnosaur crushed out his life?

Tyrann approached at last, and Cal moved—uphill. His feet sloshed in the drainage and absorbed heat. The dinosaur's feet also sloshed, and he paused to sniff the ground suspiciously. No hallucination.

A quarter mile higher it was warmer than ever, the air and earth as well as the trickling water. They were in a high valley, a kind of cleft in the mountain; not far away Cal could make out light snow, still bright in the fading day. But within this deepening hollow it was beginning to be comfortable. Ferns spread richly at the bottom, and toadstools and moss, and tiny salamanders scuttled out of his way.

Cal recovered energy as his surroundings became conducive, but Tyrann remained slow. One advantage of smaller mass was a faster response to changed circumstances. Conditions were improving; he knew it, but Tyrann did not, yet. But in this narrow

chasm he would hardly be able to lose his pursuer, and there were no hiding places. It was risky comfort, this winding summer crevice.

Unbidden, the explanation came to him. Volcanism! This was an overflow of a hot spring, the water emerging from conduits passing near the perpetual furnace of the volcanic mountain. The gully owed its warmth to the same force that heated this entire Cretaceous valley. No mystery at all, but something he should have anticipated. And that very realization, even so late, gave him the clue to victory!

The vegetation diminished as the temperature continued to rise, and he knew he was approaching the outlet of the flowing water. If it were a bubbling spring, he was in trouble; but if—

He came into the presence of the upper end of the cleft abruptly. This *was* a drainage ditch, formed by erosion, and above the emergence of the water the normal contours of the mountain resumed. The outlet pipe was a cavern, as he had hoped.

Sweating now, Cal plunged in. The river here was too hot to touch for any length of time—perhaps a hundred and thirty degrees—but there was clearance at the brim. The opening was large: large enough for Tyrann. But still it meant mammalian victory.

He moved ahead, unable to see anything inside. Tyrann's outline showed against the faint light of the entrance, but Cal knew the dinosaur would not follow.

The key was this: while cold was inconvenient for the great reptiles, and slowly fatal in the regions of its intensity, heat was more critical. A reptile's peak efficiency was at a body temperature of 95° to 100° F—about the same as for mammals and birds. But above that, the reptile would succumb more quickly than a

mammal, because it lacked any internal heat-control mechanisms other than inaction. Cal could survive for a reasonable period in an environment of 115° or more; a reptile in the same situation would cook, literally.

If Tyrann were to enter this cave and remain for any length of time, he would die. Dinosaurs could not sweat.

On the other hand, Tyrann would soon grow hungry waiting outside. Indeed, he must be ravenous already. There was no food nearby. Cal would suffer too, of course—but he could rest in warm comfort, and drink water to ease the pangs.

He heard a funny lapping sound and peeked out. Tyrann was hunched before the cave licking his wounds. There was blood on his body in many places besides the Tricer's gore-wound. That earthquake had really battered him! No wonder he had settled for a relaxed pace, at the end. The wounds that didn't show, the internal ones, must be even worse.

Cal found himself a comfortable ledge, sprawled out, and fell into a perspiring stupor. It occurred to him that one of the duckbilled dinosaurs, such as *Parasaurolophus*, might have entered this cave safely. That creature's nasal passages traversed the entire length of its enormous crest. This would make for super-efficient smelling ability—but probably also provided efficient cooling of the blood by evaporation from those passages. Perhaps more than one duckbill had escaped Tyrann by entering such a cave. However, hunger and the rising heat inside the mountain would have killed any creature venturing too deep, too long. Perhaps there were mysteriously defunct bodies washed out in the lower subterranean rivers every so often . . .

He slept.

"Tyrannosaurus Rex was galloping after Cal, those awful double-edged half-foot teeth snapping inches short of his frail palpitating body, the feet coming down on him like twin avalanches. Snap! and the ragdoll form was flung high into the air, striped grisly red, and that color reflected in the malignant eyes of the carnivore. One giant claw-toe came at that torn form where it landed, crushing it into the ground; the jaws closed, ripped off an arm. Cal's tiny head lolled back from a broken neck, the dead eyes staring at me not with accusation but with understanding, and I screamed and woke."

Orn saw that the mam female was troubled. She had slept restlessly and awakened noisily, and now was in a continuing state of agitation.

"How close to reality was that dream? How great is my guilt? Cal wouldn't have gotten into that thing, if I hadn't forced the issue. If he's dead—I'm afraid to think of it—it's my fault."

Orn stood up and stretched his wings. There did not seem to be anything he could do for her. Her mate had deserted her.

"And Veg—I dreamed of him too. It wasn't love, it was sex, and ugly. I tried to split their friendship, and now they're both—gone. I should never have come with them to Paleo."

Ornette still slept, fluffed out over the single egg. It was the youngest and fairest of the three, and now it was everything. Orn had picked the site for the nest, and he had erred; now two of his three chicks were gone. He could not mourn specifically, but he felt keenly that he should not have come to this island.

"But it wouldn't make sense for me to chase after them. I couldn't do anything,

even if it weren't already way too late. All I can do now is hope. Hope that the two men I love are still alive, and that this strange but beautiful world can live as well."

Orn intended to guard that last egg more carefully. The mating cycle was over. There would be no new eggs until next season. This egg had been shaken by the earth one day, and almost smashed the next; another siege could occur at any time. Could he protect the egg against that? He felt the need, but could not formulate a resolution.

"I know what's bothering you, Orn. That egg's in a precarious spot. I'll move it for you, if we can find a better place. I might as well help *someone*. Maybe the worst is over . . ."

The sun was lifting, a bubble of light behind flashing mountain silhouettes. Soon it would touch the hanging ptera and animate them. Daybreak was such a struggle for that type!

The mam got up and crossed to the main island. Orn knew she had to attend to her defecations and did not wish to soil the nest area. Not all mams were that considerate.

He looked about. Several of the pines had been overturned in the quake, and the configuration of the peninsula had changed. Now a second bridge of land joined it to the island. That was not good; it would be harder to safeguard now. Another shaking like the last and there might be no peninsula at all! He had seen what the ground could do on the island of his own hatching.

The mam returned and began to forage for edible roots. She had what smelled like food in her nestlike container, but appeared to be storing that. She found nuts from two varieties of flat-leaved trees and seemed to have enough to sustain her, though Orn could tell she was not fully satisfied. He, meanwhile, had hooked some fat fish out of the inlet and gutted them with beak and talon, offering the delectable innards to

Ornette first. He wasn't certain whether this mam ate fish also. He offered her one but received an indefinable response.

"I think the main island is better for the egg." She had started with her noises again. "It's less likely to sink under the wave." She was trying to convey something to him, and he had an idea what. He could feel the continuing tension in the rocks, the distant motions increasing local stress. The earth would twitch its tail again, soon. His memory informed him that changes normally requiring millions of years could occur in an instant, when the ground got restless.

"I'll scout for the best place, Orn." For a moment something like the innocent levity of a hatchling chick lifted her. "And you can call me 'Quilon, since we're on a first-name basis now. Short for Aquilon, the northwest wind. 'Quilon.'"

She tapped her own body as she repeated a certain sound, as though identifying her species. Of course such sounds were meaningless, but he would now think of her as the quilon, giant mam.

She departed again, questing for something. He watched her thoughtfully as she retreated. Yesterday he had extended his tolerance to this quilon whose mate had deserted her (no bird would do that!). Then the earth had moved and slaughtered two of his chicks and put the third in peril, and the quilon had helped him save the last. But for that, the problems of his own hatching might have been repeated here: one egg surviving, both parents dead fighting a croc. Now his egg would have a better chance, for there were three to guard it, counting the quilon. Perhaps it was her blunted nesting instinct: she guarded his egg because she had none of her own.

Mams were not notably trustworthy around eggs, but the circumstance was special. This was a strange, huge, clumsy,

yet brave and loyal mam with surprising comprehension despite her annoying noisemaking. It was almost as though she had her own type of memory, so readily did she grasp things. And she had saved the egg. She deserved his companionship.

The egg had to be moved. It was not safe here; a single tilt of the land could roll it into the sea, where the penetrating chill of the water would quickly extinguish it. But he could not move it; only the quilon could do that. Fortunately she was warm; this was a trait the mams had acquired even earlier than the aves. She could touch the egg without hurting it, and her digits, because they were soft, could lift it. He had no memory of any creature with this ability to turn seemingly useless appendages to such direct purpose. Limbs were generally adapted to running or foraging or fighting, while these unspecialized mam limbs turned out to be adapted for carrying a single egg!

But all this thinking and reasoning was hard. His brain had not been evolved for this, and only his solitary life and the radical change of the world had prompted this quality in him. Ornette depended on her memories far more than he did. It was as though his mind had mutated into something else in a jump like that of the strained earth; something unique and unnatural.

Then he felt it: the earth was beginning to break! He ran toward Ornette and the egg, but there was nothing he could do except settle down next to them and try to shield it with his body. If the ground jumped again, even this would not save it from cracking, for there was no proper padding beneath the egg.

The quilon ran after him. She scooped up the egg as Ornette jumped nervously aside, and held it cushioned in those almost hairless fleshy forelimbs.

Then the land broke apart. Orn was hurled into the water, to scramble back dripping; Ornette fell in the opposite direction, flapping her wings. Only the quilon remained upright, flexing her tremendous legs and leaning over the egg, protecting it.

The motion changed. Orn felt it: somewhere deep below a support had snapped. The land on which they huddled was sliding down, away from the island, becoming an island of its own. The water surged around it. The shudders continued, rocking the diminishing perch farther. The pines were standing in water now, and falling as the land slowly tilted.

There was nothing in his memory to account for this particular sequence, and he could tell that Ornette was as mystified as he. The quilon just stood with the egg, looking about. There was nothing any of them could do.

It occurred to him that the reason he had no memory of such an event—a fragmenting, slowly-sinking island—was that no potential ancestor had survived the experience.

The last of the pines crashed down, tumbling over its fallen neighbors and splashing into the water. Orn thought of using it to float to safety, but realized that the quilon could not do this while carrying the egg. Without that egg, and within it the nascent memory and experience of all his ancestry and Ornette's, there was no point in escape.

At last the motion stopped. Their new island was separated from the larger one by the length of a full-grown brach rep, and it was only slightly greater than the length of yesterday's croc in its diameter. They stood on its highest point: a terrace near the original site of the nest bounded by an escarpment leading into the water where the isthmus had been before; the land had

actually risen slightly here. But on the opposite side the surface tilted down more gradually. Had the trees remained standing they would have been at an angle.

Where would the ptera sleep now? They would perish in the night unless they found new roosting.

The quilon settled down, supporting the egg on her thighs. She leaned over it, keeping it warm with her body and forelimbs. Ornette looked, but did not challenge; it was safest where it was, and this entire sequence had left her confused. It was hard to accept, this control of the egg by the mam, but it seemed to be necessary.

How were they going to get away from here? This was no longer a suitable nesting site, yet even the short distance to the larger section of the island was dangerous for the egg. Unless the new bay were shallow . . .

"We might build another raft. Maybe the one Veg started is around, or pieces of it." The quilon was beginning to make sounds again, which meant she was returning to normal.

Orn stepped into the water, testing the depth. The footing was treacherous; he slipped and took a dunking. It was too deep, and far too chancy for the awkward mam. They would have to remain here at least until the chick hatched. They could forage on the island, swimming across individually. It would be an uncomfortable existence, but was feasible.

He sniffed. Rep, gross. Trouble!

As he scrambled back on land, he saw it: the towering head of an elas, the great shallow-water paddler. The quilon uttered a cry: "A Plesiosaur!"

Orn had few direct memories of this creature, because its sphere of operations seldom overlapped that of his own species. He was aware of its gradual evolution from minor landbound forms struggling to come even with the large amphibians, finally

returning entirely to the sea—and then a memory-gap broken only by glimpses of the larger sizes, some with lengthening necks and others with shortening necks, until this line attained its present configuration: eight full wingspans from snout to tail, the neck making up half of that. It was primarily a fish eater, but it would consume carrion or land life if available. Orn would not care to swim while an elas was near, but had no particular awe of it while he stood on land.

The rep came closer, its tiny head carried high. It smelled them, and it was hungry.

"The quake shook it up. It's crazed. It's coming after us!"

Orn would have preferred that the quilon not choose this moment to make her meaningless noises. Now the elas was certain there was a meal here. Its neck was more than half the breadth of the island fragment. There was no section it could not reach from one side or the other, if it were determined. It could not leave the water, for that would destroy the mobility it required for balance—but they were vulnerable despite being on land.

They would have to fight it off, if that were possible. The ground and sea motion must have crazed the rep, so that it was not aware that it was fishing on land instead of in water. It was not particularly bright, but *was* dangerous.

The head hovered above the island, twice Orn's height. The neck curved back from it, then forward, in the manner of a wind-twisted rush. The alert rep eye fixed on Orn.

He leaped aside as the elas struck. Like a plunging coconut the head came down, jaws gaping. The flat-flipper body lunged out of the water with the force of that thrust, and the jaws snapped within a beak-length of Orn's tailfeathers.

This much his memory had warned him of: the elas fed by paddling behind a fish and flinging its head forward suddenly, to

grasp the prey before it could escape. Had Orn not jumped when the motion began, he would have been lost. Too quick a jump would also have been fatal, for the elas could crook its neck about in a double spiral, and small corrections were routine for it.

But now the rep was in trouble. Used to dunking its head under the surface in the process of catching fish, it had not considered that land was different. It had bashed its snout hard against the ground. The jaws had actually snapped at the level of Orn's body, but reflex and follow-through had carried head and neck on down. Now its neck was spread full-length on the dirt and its mouth was bleeding where its teeth had crushed against stone and earth. Yes, it was crazed; it would ordinarily have been more cautious, this near land.

Orn whirled and struck at the exposed neck near its joining with the torso. The creature was vulnerable now but would be dead in its rage once it got reoriented. He dug his talons into the glistening, smooth-skinned column and probed with his beak for some vital or crippling spot. But the mass of flesh was too great and strange; he did not know where the key tendons were, and claws and beak were lost amidst its layer of blubber.

Elas emitted a high-pitched squeal and hauled its neck up in a magnificent undulation. The head looped back to come at Orn from the side, and he was unable to break loose immediately because his members were mired. He was lifted, helplessly into the air, dangling by both feet.

Ornette leaped to help him. She aimed her beak at the rep's eye, but the elas turned on her quickly and met her with wide-open mouth. She squawked once, pitifully, as the pointed teeth closed on her wing and breast; then she was carried upward.

Orn fought loose and fell into the water a wingspan from the rep's front flipper. He tried to attack again, but the elas was already paddling away, Ornette dangling.

Pursuit was useless. Orn could neither catch the elas nor harm it, and Ornette was already dead.

Orn climbed back on the island, blood-tainted and disconsolate. It was not exactly grief he felt, but a terrible regret. Ornette had died defending him, as he would have died defending her, and both defending their lone egg. Now her companionship had been severed and he was alone again.

Except for the egg! The most important part had been salvaged.

The quilon still warmed it. She had not moved during the struggle, and this was right. Ornette would not have attacked the elas had the egg not been secure without her protection. Nothing took precedence over that egg.

Again the oddness came to him: stranded on an exposed island, he without his mate, the mam without hers, the two of them guarding the egg neither had laid.

What was there to do but go on?

Chapter 18: Veg

VEG RECOVERED consciousness painfully. He was lying on a hard beach, his face against a wet rock, his feet in water, and he was hot. He did not know where he was or how he had come there. His head was aching, his innards soggy, and the rest of him was hardly robust.

He sat up carefully and waited for the resultant dizziness to pass. The beach was scant, hardly more than a hesitancy between land and sea, and the land itself was brief. In fact, it was no more than a

pylon of rock jutting up from the waves, with a single ledge he perched upon. Similar to the jigsaw reefs separating this section from the main ocean, really—not that that improved his position.

He had lost his quarterstaff, but retained his knife. The quarterstaff idea hadn't turned out very well; nobody had gotten any good use from the weapons. Well, next time he wouldn't bother. His clothing was torn, and his neck was welted with insect bites where it had been exposed. He wished he could puke up some of the muddy water he must have swallowed—but then he would probably feel hungry.

Strength seeped back unwillingly, and with it some spongy memories. He had fought a government agent—no, that was back on Earth, too long ago, and the man had turned out pretty decent in the end. Veg had been arrested and put into orbit with Cal and 'Quilon and the eight, no seven mantas. Then—here to Paleo, with four mantas, and a trip on the ocean. And a bash with Brach, the arm-leg lizard ten times life-size. And a bird, and—

He had made love to Aquilon! 'Quilon!

After that it became fuzzy. Her soft thighs, and Cal in trouble, and guilt and a swim and a run through the swamp and—

And here he was, tossed on a rock by himself. No friend, no manta, no woman, no bird. Time had passed; now he had a memory of shivering in the night and fading out again.

Why had he done it? After all this time, on three worlds—why had he taken her? It had not been a physical thing between them, only a promise. Now that promise was gone.

Then he remembered the rest of it. Cal—they had broken with Cal! The tyrant lizard was after his friend, while Veg had been mucking about with Aquilon. Too late he had remembered his loyalty and tried to

get there. On the way there had been another quake, that threw him into the water, and he had swum blindly, trying to get out of it.

He had been lucky he had not drowned. The waves had been bad enough, and any of the great sea-animals could have gobbled him en route. Unless those swimmers were as shaken by it all as he.

He peered over the level water. They would not be shaken now—and the tide was rising. He had perhaps another hour before his island disappeared entirely.

Well, better get on with it. Maybe Cal was dead, and Aquilon too. But maybe they were just waiting for him to find them. He'd save his regrets for the facts.

He faced toward land and dived in, the splash a mark of defiance. The impact of the water against his skin invigorated him, and he stroked strongly for the shore. There were scratches on his back, and the salt sting did its part to spur him along.

Salt? He had thought this area was fresh water, from the stream and swamp. But maybe that was only when the tide was out, or in the river channel itself.

Something moved in the ocean. A snout broke the surface—a mighty beak. Veg saw it coming toward him.

A swimming Tricer?

It was a huge sea-turtle, attracted by the splashing. Veg had little concern for turtles ordinarily, but this was hardly the kind he was accustomed to. It was twice as long as he was, with a heavy leathery skin instead of a true shell, and its beak was horrendous. Its two front flippers were roundly muscled paddles, propelling it rapidly forward. This was the beast that Cal had termed Archelon, when they had observed it from the raft. The only reason Veg remembered the name was its resemblance to Aquilon. Arky, he had dubbed it, and forgotten the matter; but it didn't seem quaint or funny now. The

head alone must weigh as much as Veg did!

He treaded water, uncertain how to react. He didn't *think* turtles ate people . . .

Arky glided up, sleek and swift in its element. Veg realized that he had been foolish to judge its capabilities by those of its cousins he had observed on land. This was a mighty creature, capable of wiping him out casually. He gripped his tiny-seeming knife. Would it even pierce that skin?

The turtle sniffed him. Veg wasn't sure that was possible with its head under water, but it remained the best description. Then it decided he was not edible, and nudged away, its ball-room carapace brushing his legs. He felt giddy with relief—a sensation rather strange to him. Obviously he wasn't as much recovered as he had thought. The cuts on his back smarted again.

Arky lifted its head above the water. Veg followed its seeming glance—and spied a ripple coming in from the open sea. It was another creature.

And—he saw the disk of a manta, also coming toward him. That was immensely reassuring. Hex, probably, on the lookout for the lost party. Now he could get in touch again, and find the others.

Provided they still lived. That quake had been rough.

Hex arrived before the sea creature, but not by much. The turtle floated just under the surface, twenty feet away, facing the swimming newcomer. Veg, now assured of his safety, stroked once more for shore.

He heard the thing come up behind him, splashing softly, and had to look. It was a mosasaur—the most vicious reptile of the sea. Thirty feet long, the torso highly flexible, the tail splayed vertically and quite powerful enough, and four paddle-shaped limbs. The head was narrow, the nose pointed, but the jaws were lined with ample sharp recurved teeth. A kind of crest or

ridge commenced at the neck and trailed all the way back into the tail, and this waved ominously just above the water as the creature swam. It was as though the worst features of crocodile, turtle and shark had been combined and magnified—and Veg was frankly terrified.

Suddenly Hex's protection seemed scarcely sufficient. Mosa was too big, too ugly—and most of its body was shielded by water. It could come at him from below, and the manta would be unable to strike.

Mosa circled both him and the turtle, as though considering which one to attack first. Arky, fully alert to the danger, rotated in place, always facing the predator lizard. Evidently the turtle did not trust its armor to withstand Mosa's teeth, though possibly it was only the turtle-flippers, that could not be withdrawn into the body, that it was concerned about. If Arky were worried, how should Veg feel?

The shore was far too far away; he could never make it now. The diminishing rock he had sighted on was still fairly close, thanks to his dawdling—but he couldn't get there either while Mosa was watching.

Hex paced above the water, making a tight circle inside that of the mosasaur. The reptile was aware of the manta, but not particularly concerned. Probably it thought Hex was a pterodactyl, waiting for the remnants.

Veg was pretty sure Mosa would decide on the warm, unarmored appetizer: himself. Then, invigorated by the morsel, it could tackle the tougher turtle at leisure. No particular genius was required to select the easy prey.

Mosa decided. It angled smoothly in toward Veg.

Hex struck out the exposed eye.

The reptile didn't seem to realize what had happened, immediately. It continued its charge, drifting in the direction favored

by the remaining eye, its teeth snapping.

Veg started to swim for the rock. Mosa spotted the motion and came at him again, jaws wide. By accident or design, its good eye was under the water, safe from Hex's lash.

Veg had an inspiration. He launched himself at the big turtle.

Mosa sheered off, momentarily confused by the combination of objects: two together in the water, a third in the air. Veg remembered something Cal had said once, about animals becoming confused by more than two objects; they could not count. Arky was also confused, unable to concentrate on Veg while the dangerous lizard was so close behind. It was also annoyed by the manta.

Veg bypassed the beak and touched the smooth hull. It might not *look* like a turtle-shell, but it seemed rock-hard. He got behind it and stayed close. There wasn't anything much to hang on to. Mosa made a feint, and Arky forgot about Veg as it braced against the greater menace. Hex continued to pace the surface. It was an impasse of a kind.

Mosa circled, adapting to its limited vision. It had no intention of giving up the chase; in fact, the taste of its own blood might well be stimulating it to some berserker effort. And it seemed to Veg that Mosa did have the physical wherewithal to prevail, for it outmassed man, manta and turtle combined and was fully adapted to combat in the ocean. Even completely blind (Hex might yet get the other eye) it could probably sniff him out and finish him off. Arky was only a temporary cover; once the turtle decided to depart, Mosa would pounce on the mouthful remaining, shrugging off the superficial lacerations Hex might inflict.

It was death in the making for him. A kind of checkmate demise, as one piece after another was nullified, but inevitable.

Somehow the end no longer frightened him the way he thought it should. Had there been an element of chance about it, he might have been eager and nervous. As it was—

Chance struck. A fleet of sharks converged on the scene, slim sleek missiles of appetite. In a moment Mosa, the wounded one, was the center of attention.

Suddenly Veg understood what had happened. He had dived off his rock, originally, making a splash that attracted the turtle. But meanwhile his scratched-up back had been bleeding into the water, and Mosa had smelled it. Then the commotion and Mosa's own injury had alerted the sharks . . .

Chance? Maybe less than he had supposed.

But very soon those killer-fish would come after *him*.

Mosa was now in a fight for its life. No single shark approached the reptile in size, but there were as many as a score of them, some as long as fifteen feet, all maddened by the blood. Already they had torn great gashes in Mosa's hide. Several of their own number were dead, for Mosa as an individual was more savage than they—but now the checkmate had been reversed.

Arky, no dumb bunny, took this opportunity to dive for safer territory. Its mighty flippers clove the water, creating a turbulence that jounced Veg around and towed him under. Then the turtle was gone, moving more rapidly than he could follow.

Veg struck for the rock. Two sharks detached themselves from the main platoon as though central command had allocated them, and cruised after him. Hex sliced up their projecting fins and set them to fighting one another. This diversion was sufficient. He made it to safety.

Ankle deep, he stood on his isle and wondered what he would do when the tide

made him available to the sharks again. Hex could not divert them indefinitely. Veg could not expect luck to save him again. He was not, in sober analysis, one of those hero-types who won out no matter what the odds against success. He felt empty without Cal, and deep remorse for the split that had overtaken them. It hadn't really been Aquilon's fault, either; she hadn't meant to make trouble like that.

How easy, now, to pass judgments on his prior conduct . . .

Hex perched on the highest point of the rock, his foot splaying out to grip it clumsily. It was a sitting and pushing type of foot, rather than a grasping member, and the posture had to be uncomfortable—but Hex appeared to be staying until the end. There was no use in Veg himself trying to climb that point; it was too small and steep for anything but a perpetual balancing act, and this would only postpone the finish, not change it.

Where was Cal now? The manta Circe had said the tyrant lizard was after him, alone. That was sure death for the little man. But Cal was funny about that sort of thing. He might have found a way to—

Impossible. What could a man, any man, do against Tyrann? Cal was digested by now.

No, he couldn't be. Not his friend!

Veg realized that he had only to ask Hex. The manta would surely know. A snap of the tail would tell him Cal lived; two snaps—

He choked on the question. It would not come out. He was afraid of the answer.

The water was at his knees. Already a small shark was circling the rock, waiting.

Should he die without knowing?

Maybe this was his punishment for despoiling Aquilon.

Veg looked across the water, at the savage valley, the snowtopped mountains, the

islands reaching into the sea, the level horizon showing beyond the channel between the large harbor islands, Silly and Cherub-dis. He looked, expecting nothing.

And saw a ship.

Chapter 19: Cal

TYRANN'S BULK almost blocked the opening. The carnosaur was sleeping, his body spread out along the stream bed to capture every vestige of warmth therein. The hot water from the cavern puddled at his nose and coursed along his neck—the only thing, in this snowline dawn-chill, that was keeping him reasonably functional. The flesh was discolored where the hottest water touched, but evidently the reptile had elected some heat-discomfort in spots instead of the lethargy of cold all over. Probably it inhaled warmth this way. This was courage of a kind.

Cal stood just within the cave mouth, where a refreshingly cool circulation occurred, and surveyed the situation. It was possible that Tyrann was playing possum, waiting for the prey to come out—but Cal doubted that the reptile was capable of such subtlety. It was not an art large predators usually needed for survival. Tyrann would normally sleep until the heat of the day raised his body temperature to a suitable level. In the valley this would be a simple matter—but the chill of this upper region was apt to make it a long sleep indeed. It had been a mistake for Tyrann to settle down here, for without continuous muscular exertion to maintain his body heat, he could not survive.

Probably Cal could climb right over the ugly jaws and be on his way with impunity. Victor in their contest, he could make his

way along the shore to the Paleocene camp. It might take him several months to make it, and there would be other hazards—but if he made it to that radio, his course was justified. To the victor belonged the spoils—the spoils of a world.

Yet he hesitated, looking down at the great prone reptile. He was not afraid of Tyrann—indeed, had never been—for he understood the creature's needs and motives. They were the same as his own: survival. Tyrann accomplished his purpose by size, power and determination. Cal used his intelligence—and determination. The fact that he had won did not mean that his cause was morally superior. It meant simply that he had demonstrated a greater capability for survival, in this instance.

If he summoned the forces of Earth (for casuistry aside, that was surely the gist of his report), he would be pitting an advanced world against a primitive one. That would not be a fair contest. Very soon the dinosaurs would be extinct again, and Paleo would be just like Earth: crowded with neurotic humans, its natural resources depleted . . .

Veg and Aquilon were right. His alternate-universe framework was theoretical. Each world was a separate case, and the means did not justify the end. Particularly when it meant the destruction of a known world for the sake of unknown ones . . . that might in time be ravaged anyway. Man did not have the esthetic authority to do such a thing to *any* world, and Cal had to judge by the case before him. He could not throw Paleo to the omnivore.

Studying Tyrann, Cal knew himself to be a hypocrite. The truth was that he had expected to lose, and thus preserve this world a moment longer. He couldn't accept victory, and had never intended to. He had argued the ugly cause merely to put both

sides on record. That would be important, in the Earth-sponsored court-martial that would follow the abrogation of their assigned mission. That could protect the trio to some extent, and the mantas. Selfish motive!

Tyrann was too noble a brute to be arbitrarily extinguished at man's convenience. Let Paleo remain unspoiled a moment, geologically speaking, longer. Let the dinosaur find his own destiny. Let the king of the reptiles rule today, even if extinction was inevitable tomorrow.

But Tyrann would die today, in effect, if he remained before the cave. He had cooled off during the night, since the tremendous muscular dynamo of his body had cut down into torpidity. A lot of heat would be required to revive him, and it might never get warm enough long enough here in these mountain reaches to do the job. Tyrann could sleep himself into starvation.

The hot water, at least, would have slowed the process, and in any event it would take some time for ten tons of flesh to cool completely. If Tyrann were brought to consciousness before any further heat loss occurred, and while his considerable bodily energy resources remained . . .

Cal stepped out of the cave, feeling the chill immediately. He kicked the yard-long snout where the water made it tender. "Wake up, lazybones!" he yelled.

An eye flicked open, but Tyrann did not stir. That insidious cold remaining in his flesh immobilized him, though the sun was now hot upon his flank and the water softened his belly. The mighty reptile had a mighty chill; he could not leap to full awareness and performance the way a mammal or bird could.

Cal put a foot on Tyrann's nearest tooth, slung his knee against the nose, mounted to the top of the head and tromped about. "Get on the ball, sleepy! I don't have all

day!"

A hiss of annoyance issued from the tremendous, flaccid throat. The muscles of the bulging neck tensed and Cal slid off, caution not entirely forgotten. The skin was hardly sleek, this close; it hung in elephantine folds, mottled and blistered, and infested with insectlike parasites. Tyrann, he thought, probably itched hugely in his off moments.

Cal scrambled around the looming shoulder, avoiding the clenching, almost-human extremity below it, and trotted to the side of the gully. "Can't catch me!" he shouted. He pried a fragment of rock out of the rubble and lobbed it toward the head. It missed, but the second had better aim.

Tyrann bestirred himself. Water gushed down the channel as the ponderous body elevated. Stones splashed into it, dislodged by the hulking, careering shoulders. Clumsily, laboriously, Tyrann stood up and turned about.

Cal danced along the gully, skirting the hips and tail barely in time. He paused only long enough to be certain the reptile was on his trail again. Then he plunged downhill, following the warm channel. He wasn't worried—yet!—about being caught. It should be at least an hour before Tyrann was really alert. By then—

By then, perhaps, they would be well into the warm valley and he could slip away, leaving the monster frustrated but alive. Cal had won his victory; all he wanted now was to return Tyrann to his habitat. After that—well, he no longer had need of the journey upcoast, since he was not going to make the report. He'd just have to hope he had misjudged the intent of the Earth authorities.

Progress was faster than that. In ten minutes they were out of the snow region. In twenty, the air was appreciably warmer, almost comfortable. In thirty, away from

the opening gully—

"Veg!" he cried. But it wasn't Veg.

The man nodded briefly, hands on his steam rifle. "Dr. Potter, I presume."

The exchange had taken five seconds. It was enough of a pause to bring Tyrann into sight. Still clumsy but recovering nicely, the dinosaur bellowed and charged down at them.

Almost casually the stranger aimed his weapon and fired. A hiss as the steam boosted away the shell and dissipated; a clap of noise as the projectile exploded. As Cal turned, Tyrann began to fall. His head was a red mass.

"Just about in time for you," the man remarked. "Where are your companions?"

Tyrann was dead. The great body still twitched and quivered, and would continue to cast about for some time, but the head had been blown apart by the explosion. The shell must have scored directly inside the mouth: an expert shot. It was a cruel demise for the carnosaur, and an unnecessary one; at this stage as harsh as the murder of a friend.

Cal studied the man while his body recovered from the strain of the chase and his mind encompassed the tragically altered situation. He recognized the stranger now: an Earth-government agent, similar to the one he had known as "Subble." There were many of them, all basically similar to each other, differing only in superficial respects. This was deliberate. They were, in a manner of speaking, made that way. This one was dark-haired and heavy-featured—but the body was that of a superman, and the mind, Cal knew, was abridged but very sharp. This man would be able to quote all the Bible and much of Shakespeare, but would not have studied either creatively. He would have no truly individual personality. His past was a prepared memory, his present a specific mission, and his future

irrelevant.

The question was, why was he here? Here on Paleo, the world of the paleontological past. Here in the reptile enclave. There should be no human beings here, apart from the trio.

The only sensible answer was the trio had been followed. That suggested that Cal's worst fears had been realized. Their debate about the nature of his report on Paleo had after all been academic.

"Come with me," the man said gently.

Cal offered no resistance. He knew the agent could kill him or severely incapacitate him in a single second or an hour, whichever combination he chose. And would, if the occasion warranted. Obviously this encounter had been no accident.

"I am Taler," the agent said as they walked south.

So he was of the generation after Subble: the T's. Agents tended to go by three-letter codes, modified for pronunciation. Each generation (speaking mechanically, not biologically) was uniform. A given individual would react to a given situation in a manner so similar to that of his pseudo-brothers that the coordinating computer could accept his report without modification for individual bias. This was said to facilitate law enforcement immensely, in its various and often obscure ramifications on violent Earth.

But why had an agent been dispatched at all? This was supposed to have been a civilian mission.

He was pestering his own mind with rhetorical questions. The answers were all there, if he cared to bring them forth. Why an agent? Because the civilians were no longer needed. Earth had already made its decision with regard to the disposition of Paleo.

Cal had not made any specific reports, but had been aware that the radios

maintained a carrier-signal, pinpointing their geographic whereabouts at all times. The one in the Paleocene camp was probably still broadcasting. The other must have stopped when the raft had been upset by *Brachiosaurus*, drowning the equipment. This could have looked very much like sabotage.

All he had promised had been an eventual technical report: itemization of flora and fauna, climate and geography. He had planned to deliver his conjectures on the nature of the planet itself—the alternate-world framework. That would have been food for thought, for it suggested that there was not merely one world available, but an infinite number, if only connections to them could be established. Paleo, instead of representing merely a regressed Earth, implied a new universe, some of whose worlds could be very close in nature to the modern Earth.

But the short-thinking authorities had not waited. They had evidently concluded that if a party of three could survive this long on Paleo, it was habitable and safe, and therefore wide open for exploitation. No doubt many corporations were eager to make their investments and begin profiting. So a more substantial investigation had been organized—in fact, it had probably been in the making before the trio was ever assigned. No wonder they had been boosted through so precipitously, back at the orbiting station! If the guinea-pigs were to be used at all, it had to be immediately, lest the larger mission be delayed. Report? No more than a pretext, to conceal from the trio their true insignificance.

So Cal's notion that Earth would patiently wait for his delayed report had been wishfully naive. That was not the nature of the omnivore.

Cal repressed his further thoughts, aware that the agent could ferret them out quickly

if suspicious

They arrived at Taler's camp. A glossy-fabric tent had been pitched in the forest, stark contrast to the ancient Ginkgos surrounding it. Inside the tent sat another agent, operating a radio. Yes—they were in touch.

"Taner," Taler said, introducing his comrade.

Taner spoke into the mike. "Calvin Potter secured. Fungoids loose."

Secured? Another line of conjecture opened up. An ugly one. He had not been even nominally rescued—he had been taken prisoner. And they were searching for the mantas.

Why? Why indeed! Here was a world for the taking—provided the mantas didn't take it first. Any two of them could sporulate by committing suicide, and cover the planet with the very population the Earth-government abhorred: advanced fungoid entities. That would ruin it for colonization, by certain definitions, and reduce the spoils to ashes.

Perhaps it would be better that way. The manta, at least, was an honorable creature.

Taler turned to him. "I see you comprehend our purpose, Dr. Potter."

Oh-oh. He had forgotten, for the moment, the uncanny abilities of these men. By studying his reactions to stimuli—and words themselves were stimuli—they could virtually read his mind.

"Precisely," Taler said. "Now it will be easier for us all if you choose to cooperate. Where are the other members of your party?"

They would run Veg and Aquilon down soon enough anyway—perhaps already had. Presuming the two had survived the quakes. A speedy pickup—yes, Taler was testing him in much the manner old-time police had verified the performance of their drugs or lie-detectors, by asking preliminary

questions to which they knew the answers. "I left them on a small island in the eastern bay, together."

"And the fungoids?"

That was another matter. "I told them to get lost."

"You are a clever man, Dr. Potter."

Cal smiled grimly. "Common sense suggested that where there were two such highly trained agents as yourselves, others could also be present. Since I actually asked the mantas to observe my encounter with the carnosaur but not to interfere, I am reasonably certain that I have been under observation by them. Since it does not appear to be to their advantage to have these creatures captured by you, it was natural that I express my sentiment."

"However obliquely, and with insufficient precursive tension to alert me in time. Two fungoids were in the vicinity," Taler admitted. "They departed when you amended your prior instructions by suggesting that they 'get lost.' Our personnel were not quite quick enough."

"It would have been messy," Cal said, "had I suggested instead that they attack."

"Correct." Taler pulled aside a flap of the tent and revealed beneath it several heavy cables. These divided and subdivided and fed eventually into the material of the tent itself.

Suddenly Cal was very glad he had warned the mantas clear. The tent was a network of filament! The moment sufficient power was applied, he was sure, the entire surface would flash like a nova, blinding every sighted creature nearby. The agents would have some kind of protection—polarized contact lenses, perhaps—but the mantas would have been destroyed. Alive but dead, for the sensitive eye was virtually their sole sensory apparatus.

That showed how well Earth understood

the manta metabolism, now. For in death the bodies of the mantas would dissolve into spores, and in country like this it would not be possible to be assured of destroying every drifting bit of life. Living mantas were no such danger, and a blind manta would be innocuous—unable to strike either in life or death.

"Now we shall have to run them down the hard way," Taler said, showing no malice. "That may mean considerable damage to the area."

Cal knew the agent meant it. But the matter was out of his hands now. "What about the others?"

"We picked Vachel Smith off a rock in the ocean, and one fungoid accompanied him voluntarily. They are confined aboard ship in good condition. Taner is about to go after the girl and her companion. I see you did not know your associates had separated."

"I hadn't known any mantas had rejoined them, either. Well, at least I'll have company in the brig."

Chapter 20: Orn

THE ISLAND was still dark as Orn roused the sleeping quilon with a careful nudge of his beak. Something was wrong. There was an alien presence he could not fathom—the same horror he had experienced the first time he had encountered the giant mams and supposed, erroneously, to be an aspect of their own strangeness.

She woke nervously, brushing her forelimbs, against his underfeathers, touching the warm egg for reassurance. He knew that gesture. It meant that she feared for the egg, that some danger threatened it.

And that was why he had alerted her, for he did not like this odd visitation. Would she sense it too?

"Circe!" she exclaimed. "You came back!"

She saw it! And—she was not frightened. Her reaction, her sounds, were of relief and welcome, not apprehension.

"Veg—Cal—are they safe? Where are they?"

She was trying to make contact with it! She was friendly to this un-creature. It could not, then, be a threat.

Braced by this realization, Orn concentrated on the spot of greatest disturbance. If the quilon could perceive something there, so should he. His eyes were better than hers, and his nose too.

All he found was an unfamiliar growth of fungus: a tremendous toadstool. He could not read its life history, for it deviated too far from the lines he knew. It had not been there when they fought the elas. But it was the nature of these things to sprout very rapidly.

It moved.

Orn looked to discover what had dislodged it, but observed no cause. There was no wind, and no animal had brushed against it. The ground had not quaked. The water had not washed ashore.

"They're safe!" The quilon was happy. She liked to see the toadstool move.

"Is the water clear now?" She was making query-noises. Orn was able to comprehend more and more of her mannerisms and read her intent. But he could not determine her precise concern. She was smarter than most mams, but fell short of Ornette's level, and was subject to meaningless and transitory expressions.

The toadstool disappeared. Astonished, Orn left the egg momentarily to probe the ground where the thing had grown. It was as though it had been lifted away by the

wind—the wind that wasn't there. Surely the quilon had seen the phenomenon. Plants never moved of their own volition!

"Circe is checking out the region. We'll have to move off this rock, Orn, and we can't do it while the reptiles are about. I think I can manage the egg, provided the water isn't too deep and nothing attacks us. Circe can guide us—"

Orn wondered whether this continuous noise could have been what drove the male mam away. Certainly it was irritating, when there was the problem of foraging while guarding the egg against both known and unknown menaces. Already that chatter had brought upon them a disastrous visitation by the elas.

The toadstool reappeared, drifting like a frond in a gale. Orn was able to see it clearly now that he was aware of its properties. These were contrary to all that his memory told him. But gradually he was able to accept that this fung had somehow evolved entirely separate from his own ancestry. Just as the ordinary animals had split from each other and developed over the millennia into dissimilar lines, so had this. Perhaps it had happened entirely in this valley, unvisited by any of his own line. Thus its utter strangeness, that had rendered it virtually imperceptible to him except as a vague horror, was not really so sinister. A creature with metabolism resembling that of a plant, yet as active as an animal. One without wings, yet that flew. Now that his mind had conjured the necessary evolution of the species—a fung that reached for organic food, then jumped for it, until it had become dependent on such motions for sustenance—he could accept it.

Just as a mam could become as large as a small rep, and make perpetual noises, so could a fung become a flying toadstool.

The thing had planted itself in the ground again, and the quilon was making

her noises at it. Perhaps the two odd species, mam and fung, had evolved together, and somehow understood each other. Such a connection would be no more remarkable than what he had already observed in this changed world.

The quilon faced him. "Circe says there is now a deep and treacherous chasm between us and the main island. The fault must have opened up there, and we can't cross it unless we swim. But I can't swim holding the egg. I mean I might try it, but the cold water would kill the embryo. But Circe says the bay between us and the mainland is shallow, maybe only chest deep on me. The quake must have pushed up the bottom in a ridge parallel to the fault—well, no use trying to explain *that* to you. She can show us the best route across, so we can wade. And she says there are no big reptiles in the immediate area right now, and no sharks; they're all gathering around some battle several miles away, where there's a lot of blood. Something like that—I'm not sure. There's a sleeping duckbill by the main island, and he won't bother us anyway. But the tide's coming in; we have to do it right away if we're going to, otherwise it'll be hot by the time the water's low again, and the sea-predators will be out in force."

Orn ignored her chatter. It was dawn—the best time for hunting, because most of the reps were torpid, though not the sharks. He would have to forage for the mam as well as himself, since she had to warm the egg. He had observed that she did not consume fish, sticking instead to tubers and berries from the island. He could cross over now and sniff out some roots for her, then feed himself.

The toadstool flew out over the sea again. The quilon stood up, lifted the egg—and *walked into the water!*

Orn squawked and fluttered after her, appalled at her folly. The cool sea would

deaden the life in the egg! But she only made vocal noises at him, refusing to be summoned back.

He was helpless. Any measure taken against the quilon would surely immerse the egg—the very thing he sought to protect. He could not carry it back himself; he had to wait for her to do so. He realized that she meant no harm—but she did not seem to comprehend the danger. How could he make her understand?

She stepped cautiously away from the rock, the water rising to her removable hip-plumage. She held the egg against her fleshy breast with one forelimb, balancing with the other. She was moving away from the main island, following a course suggested by the motions of the flying toadstool.

Orn started swimming, being too light to maintain his footing at this depth. The quilon, well over half immersed, continued toward the mainland. She wasn't even trying to get to the island!

He had no notion how to abate this bizarre exploration. Had he known the mam was prone to such action, he would never have left her with his egg. Now all he could do was parallel her course and hope she would turn back before the egg was lost. He would have to kill her if she sacrificed it through her stupidity—but he did not want to do that.

The sea beneath him was clear. Small fish circulated temptingly, and he was hungry, but he could not go after them now. He could not see through to the bottom, for it was quite deep, though where the quilon walked it was unusually shallow. Memory told him that earthfaults under the sea were sometimes like that: one side high, the other low, or two ridges separated by a chasm. But how had she known?

She was in now almost to her head. The egg was precariously lodged on her

shoulder, nestled in the yellow mane that descended from her scalp. Both her forelimbs were raised to shield it. This was not adequate coverage; the egg would soon grow cool there, even if the water that was already plastering her artificial fur to her bifurcated udder did not rise farther. He swam closer, though he could do nothing.

The quilon stopped. "Too deep. I can't keep my footing. If I lower my arms, I'll float, and the egg will unbalance me—"

Sometimes such sounds seemed to signal a change of intent. Would she turn back now?

She worked her way back until the mane drew entirely out of the water. She held the egg close before her, warming it though her torso was wet. Then the toadstool came near, bouncing on the surface, and angled away in a slightly different direction. She followed it.

Again she went as deep as she could go, and again she uttered her frustrated sounds and retreated. The toadstool circled, seemingly unable to point the way again. Now would she give up this hazardous enterprise and return his egg to land and safety?

Safety? Even the mainland, with its rampaging reps, was safer than the hideously exposed bit of rock they were stranded on. Had it been possible to move the egg even to the main island—but the canyon in the sea prevented that.

Then Orn realized what the quilon and her obscure acquaintance were attempting to do. Shallow water leading toward the mainland, while the tide was low—

He went into action. He dived, spreading his wings against the water to provide the impetus that would send him under. He explored the bottom with his beak and eye.

Ahead of the quilon the ridge descended, then rose again to a level he thought she could navigate. If she could cross that

deepest portion, she could travel a long way toward land—perhaps all the way. But she could not pass the hollow without immersing the egg. Perhaps only four lengths of her body—about four wingspans—separated her from the resumption of navigable shallows.

This was not the type of thinking Orn's mind was made for, but his long apprenticeship in solitary survival, coupled with the present pressing need, sharpened his abilities. There were problems memory would not solve, and this was one such. How to get the mam female across the gap without dunking the egg—and soon enough so that the rising tide would not make it entirely impossible.

Had there been floating wood, memory might have sufficed. His ancestors had utilized logs to cross from island to island upon occasion, or from side to side of deep rivers. But there was no log here. Orn himself was the only thing afloat—and only the relative stillness of the water enabled him to maintain his balance. Waves, or any other threat, could swamp him, for he was top-heavy and lacked webbed feet. He was actually better at swimming under water than on the surface, because there his abbreviated wings were effective.

But in this emergency, his abilities might be enough to save the egg. And the egg was paramount.

Orn paddled up and nudged the standing quilon. She was silent now, and water seemed to have splashed onto her face though the egg was dry. There was a certain unhappy handsomeness about her as she stood balked, and he wondered to what extent mams had genuine emotions.

But there was no time for such idle considerations. Orn nudged her again, trying to make her understand. The egg could be saved, if her dull mam brain could rise to the occasion.

For a moment she did not move. Then, slowly, she placed one forelimb across his back, bearing down on his body so that he sank in the water. She was astonishingly heavy, but he spread his wings somewhat and kicked his feet and maintained his position. He could not endure this for long; his instinct and memory cried out against such proximity to a foreign creature. But long enough—

She moved the egg until it rested partly against his back, just above the water. Then she pushed slowly forward. Her body went down, but the egg remained high, its weight borne by his feathers.

At the place the mam had balked before, her feet left the bottom and she floated. Orn paddled desperately to maintain his balance as she lost hers. It was difficult; he was tilting irrevocably over—

Then the quilon's stout legs began to kick in the water, driving them both slowly ahead and restoring joint balance. He steered and she held the egg on his back. A single bad wave, even a gust of wind would topple them.

The toadstool circled rapidly, as though even its vegetable intellect were aware of the crisis. Orn glanced at it—and saw the suggestion of motion in the distance behind it. Something was coming!

Almost, in his instinctive eagerness to scramble for safety, he dislodged the egg. But he controlled himself after a single jerk and went on paddling. Perhaps it was only one of the sporting cory reps, who were unlikely to stray this far out from shore.

Progress was so slow! Only by poking his head under the surface and noting the locations of the bottom features was he able to determine that they were moving. If a predator rep came upon them now—

It did. It was the elas, the flippered paddler who had carried Ornette away before. Already it was hungry again, or

merely mischievous, and their motion in the shallow water had summoned it from its hiding place. Here within its feeding-ground they had no chance at all to escape.

The toadstool broke its circle and went to meet the elas. Orn could not watch closely, for his balance remained precarious. He saw the fung rise high in the air as though it were a ptera and pass over the lifted head of the rep. Nothing happened—but the elas emitted a tremendous honk of pain.

Then it was retreating, and the smell of its blood came to him. Had an old wound reopened as it strained to snap up the toadstool? Or had it merely been frightened by the oddity of the fung, and the blood remained from the wound Orn had inflicted on its neck, before?

Orn was satisfied that they were safe again. Joy was no more a part of his nature than was grief, and the security of the egg was what mattered. Somehow the rep had been turned away.

The animal panting of the quilon became loud, and his own respiration was labored. He was, in the aftermath of the rep threat, quite tired. He had been subjected to a double strain—the weight of the quilon and egg on his back, and the fear of the elas when he was impotent as a fighter. But they were over the shallow section again. He honked, trying to convey this to her, and finally she stopped kicking her heavy-boned feet and pushed her round extremities down until they struck the bottom sand.

The rest of the crossing was easy. Twice more he had to assist the quilon, the rising tide making the portages longer, but now they were both familiar with the routine. The flying fung guided them unfailingly, selecting the best route. Orn was coming almost to like such toadstools.

Secure at last on land, they lay on the pleasant beach, the egg warmed between them. The toadstool also rested nearby, a

hump with a single peculiar eye. He could see it quite clearly now, though it remained a most unusual phenomenon.

The quilon had been right: the drive for land had been best. The chick still lived in the egg; he could feel its living presence. With the elas remaining so near, they would have been perpetually vulnerable on the fragment island. Now they had a chance, and the egg too. The mainland was by no means ideal for nesting, but the island had turned into a death trap.

Orn looked about. He knew the terrain because he had pursued Ornette here during their courtship. Not far back from the shore the snowy mountains rose, riddled with their caverns and gullies and heated waters. Somewhere near the snowline there might be a suitable nesting site. The cold would make it doubly difficult to warm the egg, but this was necessary to escape the predator reps, who ordinarily would not ascend that far.

He stood and led the way, and the quilon followed, submissive now that she had done her task. She held the egg closely against her damp body, enclosing it with her forelimbs so that as little as possible was exposed to the air. Actually, the heat of the day was upon them, so this was no longer critical. The fung vanished into the brush; he spied it only occasionally.

Between shore and mountain was a level plain, an extension of the larger one the tricer herds ranged on. Here the palms were well trimmed, showing that the huge reps had foraged here recently. Though he did not fear them himself, he was not certain how they would react to the large mam. They might ignore her—but if they did not, the egg would be in peril again. He decided to change course so as to avoid the local herd.

Then he sniffed something else. It was another large mam of the quilon species—a

male.

Orn did not know whether this was good or bad. The male had left the female, and perhaps this return meant a reconciliation. But it could also mean trouble. Orn would not ordinarily interfere with mam courtship and mating rites—but he needed the quilon female to transport the egg, and to warm it while he foraged. He could not hatch it alone.

Before he could make a decision, the male approached. It was not the original mate.

There was a babble as the two mams vociferated at each other. The toadstool had taken off at the first whiff of the visitor; Orn smelled it in the vicinity but could not spot it.

The haphazard dialogue continued. Orn picked up the sequence of reactions from the female: surprise, comprehension, anger, fear. She did not like the stranger, but was afraid of what might happen if she made an open break. She suspected the male of malicious intent. Her concern was not primarily for herself, though; it was—

For the egg!

Orn was already charging as the realization hit him. His wings flapped to boost his speed; his beak aimed forward. Headfirst, he launched himself at the strange male quilon.

The creature was not facing him, but from it a bolt of lightning emerged. A terrible heat struck Orn, searing the feathers of one wing and the flesh of that wing and the bony substructure, and lancing on through his body. The wound was mortal; he knew it as he completed his charge.

The female mam struck the intruder with her free limb, but he caught it with his own and was not hurt. This also Orn perceived as the signals of death spread through his running body. The male was swift and deadly and without compassion. He would kill them both and smash the egg. This

certainly kept Orn going when he should have fallen. Only by somehow bringing the mam enemy down could he give the egg a chance—even the ugly chance Orn himself had hatched with. His own parents had died defending their nest and eggs from a marauding croc; Orn would die defending his egg from a predator mam. It was the way it had to be.

But he knew too that it was *not* to be. He had thought these mams to be slow and clumsy and not wholly intelligent. He had foolishly judged from the pair that came in peace to mate. This other mam was in his strength, and was devastating. This one would prevail.

Yet he continued, his legs somehow supporting the momentum of his body. He could at least strike at it, perhaps wound it . . .

Then a shadow came upon that scene.

The male quilon had one limb taken by its grasp on the female, the other lifted to ward off Orn. Its stout hind limbs were anchored in the soil. Only its head was free, this moment, to move about. It turned.

The shadow passed.

There was a gash across the mam's head, where the eyes had been.

The shadow returned. Orn recognized it now. It was the flying fung, moving with dizzying speed.

Fire lanced from the male again, scorching brush and trees but not the toadstool. A second gash appeared, almost circling the mam's throat. Blood pounded out.

As Orn finally collided with his target, only a few heartbeats from the time he had started the charge, he knew that both of them were dying. His weight jarred the male's grip loose from the female. Only she and the fung—and the egg!—had survived this brutal encounter.

"Circe!"

Orn collapsed in a heap with the mam, his blood mixing with that of his antagonist. He no longer had command of his body, but he could hear the female quilon's sounds. She never was silent!

"Circe! We've killed an agent! There may be others in the area, and they'll wipe us all out. They've come to take over Paleo, I'm sure of that. We'll have to cover the evidence. In a hurry."

The toadstool slowed and came to rest. There was blood on its tail.

"The Tricers! Can you stampede them?"

The fung was gone.

Then she was standing over Orn, touching the feathers of his neck with those uselessly soft digits. She still supported the egg. "Orn—you're alive!"

He had not known that death would be so slow. He was helpless, but now he felt no pain. There was only a gradual sinking to the sound of her dialogue, now gentle and no longer annoying.

"No—you can't survive that burn. I'm sorry, Orn. I—I didn't mean it to end like this. I'll save your egg. I'll keep it until—"

Her paw caressed his neck feathers. "The Tricers are coming. I have to get out of here, Orn. With your egg. Those brutes will flatten everything, so no one will know, I hope. How he died, I mean. Keep Paleo sacrosanct . . .

"I—you were a gallant soul—are one—and I love you. You diverted the agent so Circe could—you gave your life for ours, and I'll always remember that. Always.

"Goodbye, Orn."

She was gone, and somehow he knew she would preserve the egg. That was all that mattered.

The ground rumbled and shook. Tricers—stampeding! Orn tried to move, but could not, before he remembered that the effort was pointless. Their sound was loud, their massive hooves striking the

ground in a gargantuan raindrop pattern. They were coming here! The entire herd, charging along the narrowing plateau, converging on this spot, their growing cadence like the shaking of a volcano.

There would be nothing but a beaten trail, after their passage.

Orn was satisfied.

Chapter 21: Veg

HE STOOD ON the deck and watched them bring Cal in. Hex stood beside him, in his shadow, impassive as only a manta could be.

The ship was anchored in water of appropriate depth near the mouth of the great swamp. It was a double-hulled military yacht, chemically powered but capable of fifty knots. Veg assumed that the agents had assembled it piecemeal this side of the transport-tunnel, since it would have been impossible to beam the entire ship through as a unit. A big job, requiring skill and time, though of course the agents would have been programmed for it. They must have started work the moment the trio set sail on the Nacre. He didn't need Cal to tell him what that meant about the importance of the trio's original mission. They had simply been a test case, human guinea-pigs, decoy lambs or whatever, sent through on the spur of the moment to verify that the transfer equipment was in working order and that men could survive the jump. A few days to allow for any subtle residual tissue damage; a few more to make sure there were no slow-acting poisons on Paleo. Probably Noodlebrain had thought he was sentencing them to death, and it had been sheer luck that everything *had* functioned properly.

The tiny cutter docked beside the yacht. A derrick hoisted Cal and one of his captors to the deck. In a moment Cal passed across the line marking Veg's area of confinement, and the two friends were together again.

"There's a force screen or something," Veg warned him as they watched the cutter cut east. He still felt the awkwardness of their last discussion. How could things be the same between them, after . . . Aquilon?

Cal nodded. He knew all about such things. If any of them attempted to jump ship or even cross the line on the deck without authorization, the invisible alert screen would trigger automatic weaponry that would blast them immediately. The remains would be netted and englobed in seconds, so that the atmosphere would not be contaminated by their corpses. This was mainly for Hex's benefit, since his demise would release a cloud of potent spores. Earth had learned its lesson in that regard.

"Quilon?" Cal inquired.

"It didn't work out," Veg said; then he realized with fierce embarrassment that Cal had not been referring to their sexual liaison. "I left her on the island, when I heard about—" He broke off, aware that that was wrong too. Cal had not asked for help, in his contest with Tyrann.

"So Hex tattled," Cal murmured, smiling briefly.

"Yeah. Circe, anyway." The tension was broken; Cal understood. "How'd you make out?"

"Taler shot it."

"Oh." That was too simple. It meant Cal didn't want to talk about it, any more than Veg wanted to talk about his own adventure. And Cal would have explained about the other mantas by now, the missing ones, if he intended to. Something was going on.

A woman stood amidships, fiddling with

radio equipment. She was tall, slender and blonde—rather beautiful, yet quite unlike Aquilon. Veg had been observing her with covert admiration, wondering what she was doing here on this man's mission.

"Taner reports island evacuated," the woman said, every syllable clear though she did not seem to be striving for precision. "Proceeding to mainland."

Cal looked at her. "Earth is keeping extraordinarily close tabs on its representatives," he remarked. "I've seen three agents so far, with evidence of at least two others, and reporting in at every turn."

"They figure Paleo will corrupt somebody, otherwise," Veg said. "The way it did us."

"A telling point. I believe I would have termed it 'enlightenment,' however."

"And a gal aboard too."

"That's nothing to interest you," Cal said with an obscure expression. "That's a female agent."

Veg was shocked. "That little thing? A superman?"

She glanced their way and smiled. "Tamme, at your service."

Veg recalled the things the agent Subble had been capable of, back on Earth. He looked again at the girl. He shook his head in negation. She would not last long in a lumberman's free-for-all, whatever her training.

Tamme was watching him. "I *would*, you know," she murmured.

For the third time in as many minutes he felt quick embarrassment. Damn that mind-reading ability of theirs!

She laughed.

Cal looked thoughtful, but did not comment.

"Contact," Tamme said. "Bird and woman. Fungoid concealed." Then she paused, frowning. "Taner dead."

Taler's head appeared in the hatch. At

least Veg thought it was Taler; they were all so similar they were hard to tell apart unless together. "So the report was correct. The fungoid can upon occasion dispatch an agent."

"*She* must have had a hand in it," Tamme said. "Shouldn't have sent a man for that chick."

"You have to admit we aren't exposed much to attractive feminine types," Taler replied.

She threw something at his head. The motion was so rapid and controlled that Veg was only aware of the jerk of her full blouse and the flash of metal in sunlight.

Taler moved simultaneously, plucking the object from the air before his face. He held it aloft, a trophy. It was a tiny stiletto—and had he not been ready for it, the point would have skewered his nose.

They were only playing—but they were deadly. All of them. That sudden murder of their companion seemed to mean nothing more to them than an ineffective tactic. Unless this whole little episode was merely a show to impress the prisoners. Yet Subble had seemed like a decent guy, and he had been an agent not many letters removed. S U compared to T A—SUBble, TALer, TAMme, TANer . . .

Taler came to them. "It appears there is some difficulty picking up Miss Hunt. We are also interested in the three outstanding fungoids. Is the present creature able to contact others, if set free to do so? There is no need to answer."

No need indeed! Veg was familiar with this type of interrogation. The agent merely asked questions, and gauged the response from the bodily reactions of the listener. There was nothing an ordinary man could do about it.

But why were the agents so intent on capturing all the trio and the mantas? They could survey the planet and make their

report without reference to those who had gone before. The trio wasn't important any more, if it had ever counted for anything here at all, and this campaign hardly seemed worth the effort.

Well, Cal would know. Veg would follow his friend's lead.

"If you do not cooperate," Taler said gently, "we shall have to undertake a search-and-destroy mission. That could mean the death of Miss Hunt, too."

Cal did not speak, but Veg's pulses leaped angrily. Aquilon—dead?

"Interesting," Taler remarked. "Dr. Potter is even more enamored of Miss Hunt than is Mr. Smith. But Dr. Potter refuses to be influenced thereby. Since a threat of this nature would therefore be ineffective, I make none; I merely advise you that the element of risk does apply to Miss Hunt so long as she is beyond our jurisdiction."

Taler now addressed himself completely to Cal. "We shall begin with a humane nerve-gas. This particular formula should render all mammals unconscious on contact. Reptiles and amphibians will be affected to a lesser extent. Plants will suffer some loss of foliage in the following days and a few will rot. Representatives of the third kingdom—"

"Blinded," Cal said.

Taler signaled to Tamme. "Lift the barricade."

Something clicked off. "You'd better explain it to Hex," Cal said to Veg. "He's your manta."

"I'm not sure myself what's going on. You want Hex to fetch 'Quilon?"

"These gentlemen," Cal said, "want very much to have all four mantas here on the ship, alive, because if any two should die on Paleo their spores could spread and mate and produce many thousands of mantas to take over the planet."

"That wouldn't be so bad. Mantas aren't

destructive."

"These gentlemen wish to preserve Paleo for human colonization, however."

Veg smiled bleakly. "Oh. They'd have trouble, with all those mantas."

Then something occurred to him. "I don't want Earth to colonize, and 'Quilon doesn't either. We already had that out."

"I have come to agree with you," Cal said surprisingly. "Paleo should be preserved as it exists. But although I decided not to make my report, events have made the issue academic. The agents are now in control."

Veg experienced a mixture of emotions. He was gratified to learn that the schism between them was gone, that Cal was now on the side Aquilon had espoused—but angry that Cal should so readily submit to the demands of the agents. It was not like Cal to yield under duress.

Taler spoke, facing Veg. "Your friend is very clever. He has already outwitted me once, and I am not a stupid or gullible man. No agent is. Now he is planning to betray us again. I must therefore request that you address your manta immediately, without further conversation with Dr. Potter."

The manner was polite. Taler could afford courtesy. Veg knew that he was fully capable of enforcing his demand, and needed no bluster.

But the other remark! So Cal had not surrendered! That was especially good to know. But what had Cal planned? Could Veg figure it out in time?

"Instruct your manta," Taler said, his voice still mild but carrying just that hint of urgency required to make his point. Further delay would mean considerable unpleasantness. Veg did not fancy himself to be a fool.

But what could he do, except as told? "Hex," he said, and the manta rotated on its foot to face him. "These men have—do you know what nerve gas is?"

Two snaps of the tail.

Veg turned to Taler. "I have to explain—"

"Nerve gas is a substance that can be released into the air," Taler said, "it will fill the entire valley within an hour, barring exceptional atmospheric conditions. It will blind all eye-bearing fungoids without killing them—and the damage is probably irreversible."

"Do you understand that?" Veg asked Hex. He wondered how the agents had developed and tested this chemical, with no mantas to try it on. Could it be a bluff?

To his surprise, Hex snapped once. The mantas were getting better at picking up human speech and grasping its content.

"They will release this gas, if you don't go and tell 'Quilon and the other mantas to come here—to surrender. We can't stop them."

One snap.

"So I guess you'd better—"

Something crackled. Veg saw Cal fall to the deck.

"Remain where you are," Taler snapped. He was facing Hex, who had not moved, and his directive was as much for the manta as for Veg. "Your friend was about to impart inappropriate information to you and the manta. I had to anesthetize him immediately. He will recover in a few minutes, unharmed. Instruct your manta."

"They aren't kidding," Veg said to Hex, furious but helpless. "I don't like it, but I have to tell you to go bring Circe and Diam and Star back here—and 'Quilon too, of course. They'll kill us all, otherwise." Inside he was chagrined that he hadn't been able to follow Cal's plan, whatever it was. By the time Cal woke up, Hex would be on his way, and it would be too late.

"Very good," Taler said. "The barrier is down—but the creature will be covered by our cannon until out of sight. We are

equipped to englobe the remains in seconds. It has one hour before we release the gas—no more."

"One hour, Hex," Veg repeated dully. "So make it fast. I—" He turned to the agent again. "You promise not to hurt any of them, or us?"

"If you cooperate. Our interest is in completing our mission; there is no personal onus. The group of you will be assigned elsewhere, where there need be no restriction on your activities or those of the fungoids. You have my given word. That is not sacrosanct, of course, but is a statement of intent."

Veg remembered Subble once more. The man had kept his word all the way, though he hadn't been obliged to. He had to trust Taler that far.

"It's OK for all of us, if you make it in one hour," he told Hex. "Tell them that. Now get going."

Hex leaped into the air and was on his way, a disk skipping across the water. He was traveling at something like a hundred miles an hour, and in about a minute had disappeared into the foliage fringing the swamp.

Veg lifted Cal to his feet as Taler departed. In a few minutes, as predicted, the little man recovered, though he had a scrape on the head where he had struck the deck. Veg raged to see the injury done, but knew that protest would be useless.

"Sorry," Veg murmured. "I couldn't figure out what you wanted, and the bastard wouldn't give me time to think, and he could read my mind anyway, so I just had to send Hex off."

Cal gripped his hand momentarily. "It's all right."

"I blew it. I'm just not smart enough."

"On the contrary. It was essential that I be out of the way so that *I* couldn't blow it, as you put it. They were already suspicious

of me. *You* they assumed were safe."

"*I am* safe," Veg said. "Mad as hell, but safe. And I can't even slug one of them. I tried that on Subble, and got smeared."

"Yes, I'm sure Taler read that fury in you. So now Hex is telling 'Quilon and the other mantas the ultimatum. What do you suppose they'll do?"

"What *can* they do? No sense having that gas turned loose."

Cal only smiled.

Half an hour passed before a manta reappeared, alone. It glided in while the cannon tracked it and landed neatly on the deck. It was Circe.

Taler came out immediately. "This is not the same fungoid," he said.

"It's Circe—'Quilon's manta," Veg explained.

"Miss Hunt is ready to be picked up?"

"I guess. The swimming isn't so hot hereabouts."

Taler swung lithely over the rail and dropped into a second cutter. In a moment he was speeding in the direction Circe had come from. Veg wondered how he was so sure of the way, then realized that the sharp perceptions of the agent would make location easy. It was her cooperation Taler required, nothing else. Her agreement would bring in the remaining mantas.

Tamme was on deck, her efficient yet femininely conducive manner disquieting. She had sex appeal, and he knew she read his appreciation of that, and read his attempt to repress and conceal his reaction. She hardly bothered to hide her amusement.

Fifteen minutes later Aquilon was brought aboard, along with Hex. She held what had to be one of Orn's eggs in her arms; Veg had no idea how she had come by it. There was a bruise on her cheek that he didn't like to look at, suspecting that he had put it there; but that was the least of the

change in her. She was not the same woman he had known and loved.

"It's been a long time," Aquilon said. "Four nights and three earthquakes since we three were last together . . ."

"Three nights, two earthquakes," Cal said.

"You must have been very busy, not to notice. *Four*—"

"Now don't you two start fighting again," Veg interposed quickly. "Could have been ten days and nine earthquakes, for all I remember, and what difference does it make?"

She smiled, becoming the girl he had known. She held no grudge against him.

Still, they stood there somewhat awkwardly. Veg knew he really hadn't managed things very well. First, siding with her against Cal (and had it been sex that decided him?), then trying to go back to Cal when the man didn't want help, and getting stranded himself. Finally, playing the betrayer to them both by sending Hex off . . . no, he had no congratulations coming.

Suddenly he realized that the hour was up—and Cal's two mantas, Diam and Star, had not come in.

"Release the gas," Taler said. Tamme, who seemed to handle more than radios, opened a chest and brought out several sealed canisters. Frost glistened on them; they had been stored cold.

"That's pointless now," Cal said. "The two mantas are already dead."

Taler studied him. "You play a dangerous game, sir."

Cal nodded. "There is a world at stake."

Tamme spoke into her mike. "Parley has failed. Two fungoids have spored. Too late for enclosure. Proceed with alternate." She returned the canisters to their compartment.

"What happened?" Veg demanded. "I thought they were coming in!"

Aquilon touched his hand in that way she had. "They knew what the invasion by the Earth-omnivore meant. So they . . . died, and Hex cut them up and spread the spores while Circe reported back here to the ship. By now those spores are all over the valley. They can't be wiped out."

"But I told Hex—"

Taler cut in, seemingly without malice. "Dr. Potter was aware that Miss Hunt would not honor that request—and that she would correctly interpret its real meaning. Had Dr. Potter been conscious at the time your manta left, I would have fathomed his sensation of victory, and thwarted his plan. As it was, I picked up nothing from him except his nonspecific chord of emotions. In my confidence, I failed to read him later, and I attributed Miss Hunt's confused state to apprehension concerning her treatment at our hands following her involvement in the termination of Taner. Therefore I did not question her, assuming that the remaining mantas were on their way separately." He smiled with good natured rue. "I have not before been so readily outwitted by a normal man."

Veg's mind was spinning. Cal had been walking a tightrope while juggling flaming torches barehanded! So many complex factors interacting. This was a type of contest alien to him, and one he had certainly not appreciated at the time. "Why did Quilon and Circe come in, then?"

"Two sets of spores were sufficient," Aquilon said. "No point in having us all die."

"But we didn't follow through on the bargain," Veg said. "We didn't bring in all the mantas. So the agents don't have to give us any break. Maybe they'll kill us all, now."

"Does it matter?" Aquilon inquired dully, staring at the egg she held.

"Revenge would be pointless," Taler

said. "Mr. Smith's bargain was made in good faith; it did not occur to him that the others would not honor it. We agents are realistic, not recriminatory—otherwise we would have brought you to accounting for the damage done by the three fungoids back at the Earth station, and particularly the one that escaped entirely. But we chose instead to learn from the experience, and so we followed you as rapidly as was feasible."

"You mean you didn't plan to come here anyway?" Veg asked, wondering just how bad a mistake that manta break at the station had been.

"Not this particular party. The original expedition was to consist of normals—extraterrestriologists, geologists, paleontologists. When we realized the potentialities of your fungoids, this military unit was substituted." Taler faced toward the mainland, as though watching for something. "You have demonstrated that as a group, you are too valuable to waste. Future agents will be programmed to avoid mistakes of the nature of those we have made here, and you will be reassigned as agreed."

Veg shook his head dubiously. "So you're letting Paleo go, after all that trouble?"

"By no means. Our alternate program to salvage the planet for mankind is already underway. Observe."

They looked across the water. Smoke was rising from the valley—a wall of it on the west side, near the trio's original camp. The breeze was blowing it east.

"You're burning the enclave!" Aquilon exclaimed, horrified.

"The spores, as you pointed out, are beyond recovery. It is necessary to destroy them and the habitat in which they might prosper. We are doing so."

"But the dinosaurs! They have nowhere to go!"

"They are part of that habitat," Taler

weapon. That would be Tamme, an omnivore with female form. Naturally these butchers would not allow any large swimming reptile to escape, for it might conceivably serve as host for a microscopic manta.

She hugged the egg. How could she sit in judgment on her species? She herself had killed, useless gesture that it turned out to be. She was an omnivore too.

The dream of bliss was cruelly ended. The idyll of Paleo had been revealed as genocidal naivete. What good was it now to feel sorry for Elas, the one-time enemy Plesiosaur? It was less vicious than man.

She had known it before. She had seen this on Earth, this savagery.

She held the egg, wondering whether it would not be kinder in the long run to dash it fatally against the deck.

Veg focused the glasses on the fringe of the valley, fascinated in spite of himself. The fire burned everything, even the ground, even the water. The lenses brought every detail within arm's reach.

Amazing, how quickly and uniformly the fires had started, spaced to spread across the entire valley. They must have fired incendiary shells. Must still be firing them, because new centers of flame appeared at intervals, hastening the death-march of orange.

He had seen such carnage before. They had burned his own forest, back on Earth, and for the same reason: to get the manta. The omnivore (now he was thinking in manta terms!)—the omnivore was ruthless. He had thought to foil it, here on Paleo, but that had never had a chance to work.

He sneaked a glance at Aquilon, keeping the glasses to his face and pointed forward. She stood beside him, wild and beautiful, holding the egg she had saved. A blanket covered it and her shoulders, though the air

was warm. Through an open fold he thought he saw—

He snapped back to the glasses. A trick of vision, surely. But it reminded him again of their night together, that had seemed so great at the time yet had faded so quickly. It was as though he had expected more than mere female anatomy, and was disappointed to have found her, in the dark under a tarp, to be less than ethereal. It could have been anyone he embraced then. *Should* have been anyone . . . but her.

He saw now that he wanted the dream Aquilon, not the flesh 'Quilon. And the dream had been sullied. And his friendship with Cal had been demeaned.

The reptiles were charging into the water, trying to escape the fire, but it pursued them. Tricers, Boneheads, Struths and Ankys, drowning simultaneously, inhaling water and flame. And with them, he was sure, many more mammals, too small to show up amidst the giants. And birds, and insects.

Veg was not, despite his pretenses, a violent man. But had he had any real opportunity to wipe out this shipload of killers, he would have done so.

He saw a large duckbill, Para-something-or-other, smash through the smoke and dive into the sea. For a moment only its bony crest showed above the surface, and it seemed that smoke plumed back even from that. Then the dinosaur came up, reared skyward—and a jet of flame shot from its nostrils. It had taken in some of the chemical, and its lungs were afire. A true dragon for the moment, it perished in utter agony.

And farther out to sea the head of Brach emerged, clear of the fire. But the stupid brute was charging the wrong way again, going toward the conflagration. Back! Back! he mouthed at it, to no avail. Monstrous, it lumbered out of the water, fire coursing off

its back and outlining neck and tail and pillar-like thighs. The tiny brain tried to make sense of the agony surrounding fifty tons of body, and could not; burning brightly, Brach keeled over like a timbered redwood tree and rolled with four trunks in the air.

For a long time Veg watched the spasmodic twitching of Brach's smoking tail, until at last that smoke seemed to get in his own eyes, and the stench of it in his nose, and he cried.

Cal watched the destruction of the reptile enclave with severe misgiving. It was true that he had foreseen this, even precipitated it, but the cruelty of the denouement was ugly. Certainly the extinction of most major lines of reptiles was inevitable, here, regardless of the actions of man. One could no more halt that natural process than one could turn back the drifting of the continents. But the dinosaurs did have the right to expire in their own time and fashion, rather than for the fleeting convenience of man.

The masses of herbivorous reptiles had thinned, the majority already perished in the flaming ocean. Now the carnivores, unused to fleeing from anything, were coming into sight. Struthiomimus, birdlike predator; several young Tyrannosaurs; then a real giant—

He refocussed the glasses. That was no carnosaur! It was an ornithischian dinosaur, a bipedal herbivore. Iguanodon! But of what a size! Sixty feet from nose to tailtip, as scaled on the range-measure of the field glasses. Larger than Tyrann full-grown, and heavier in proportion, for the gut was massive. A total weight of twelve tons, at least. A herbivore *would* be heavier-set, of course; the digestive apparatus had to be more voluminous . . .

If a biped that size—the largest ever to

tread the earth—had hidden unsuspected in the valley, what other treasures had been concealed? The lost opportunities for study . . .

Yet it had to be. He had intended to set the manta spores loose before the Earth-mission arrived, knowing it *would* arrive. But he had misjudged how *soon*. He had debated with Veg and Aquilon, putting it all on record so that the investigators would know he had intended to summon them. And he *had* so intended—but he had meant them to arrive too late. They would have discovered that Veg and Aquilon, despite their stand, were innocent. That the mantas had traveled with him—and apparently acted without his knowledge and against his wishes. Acted to take Paleo for the third kingdom, for the manta. Cal himself would have been gone, presumed dead, for the plan did not tolerate any interrogation of him by agents. Thus the Earth invasion would have been balked, and the other two either deported again or simply left on Paleo, but not punished.

But in his vanity he had delayed, seeking to vindicate his right to make such a decision for a world. And in so doing, he had thrown away his *chance* to make it. And so he had been caught, and had had to play the game the hard way, making it expensive for everyone. Perhaps if he had not suppressed his real thoughts and intentions, had not constructed his elaborate justifications for the sake of verisimilitude—

Yet it changed nothing. The age of reptiles was finished here, whether man came or not. And the battle was for Paleo, not the class of mammals or the class of reptiles, or even the kingdom of animals or fungus.

No, the battle was not even for this world. He could have advised the mantas long before the actual enclave had been discovered. The enclave was nothing, Paleo

said. "This will hasten their extinction, yes."

She stared at the smoke, stricken.

"You can't get all the spores that way," Veg said, similarly appalled. "They're tough. Some will ride high in the sky, where it stays cool. Some will settle in the water—" He stopped, wondering whether he had said too much.

"Some spores will survive, inevitably," Taner agreed. "But the point is that they require hosts for their maturation. By depriving them of these—chiefly the omnivorous mammals of the valley—we are making it impossible for them to develop there. Some will drift beyond the mountains—but as you saw, that landscape is barren, and their numbers will be diffuse after the hurdles of fire and snow. The ocean is not a conducive habitat, either, since the fungoids are land-based. The probability is that a long-range program of survey and extermination will prevent any fungoid menace from erupting."

"The whole valley!" Aquilon said. "How could it possibly be worth it!"

"Perhaps you should have considered that at an earlier time. We were prepared for this contingency, but it was not our desire to destroy the enclave. You forced it."

"I didn't know!" But it sounded to Veg as though she lacked conviction. She certainly should have guessed that the omnivore would not be easily balked.

"Dr. Potter knew."

He was right, Veg thought. Cal would certainly have anticipated the consequence of his plot. Had he betrayed Paleo after all, making dupes of those, like Veg and Aquilon and the mantas, who would have saved it? Veg did not look at him.

"Some will escape," Cal said. He sounded worn. "The spores can survive for many years, and there will be an entire planet to hide on. In as little as a year some

will mature sufficiently to respore, and there will be no way to control that secondary crop of mantas. It will be cheaper to vacate Paleo than to police it effectively. Your superiors will realize that in time, and act accordingly. This valley had to be sacrificed for the sake of this world."

"You are gambling with genocide," Taler said. He turned to Veg and Aquilon. "If I were this man's companion, I would be afraid."

Veg watched the smoke rising, knowing that Cal had foreseen this and probably planned on it, and understood.

Chapter 22: Quartet

AQUILON STOOD holding Orn's egg: a nine-inch shell containing all that remained of a gallant pair of birds. She had wrapped a soft blanket about it, but could not be satisfied that it was warm enough. She kept turning it so as to place a new face of it against her body, lest any side chill. This was an unreasonable fear, for the air was warm and the egg's requirements were not that critical; she suspected it could survive up to half an hour in isolation at normal temperature, and perhaps more. All it needed was a general, mild warmth, such as that provided by a clothed human body.

Tell that to my female psyche, she thought. Orn had died protecting her—because she held the egg. It was her egg now, never to part until hatched. There could never be enough warmth for it.

Smoke shrouded the dinosaur valley. Soon the enclave would be a mass of embers—all because she had tried to fight the ruthless agents. She was a murderess now; it had been at her behest that Orn and Circe had attacked that agent Taner, who so

resembled Subble. Almost, when she had seen him first, she had capitulated. But then she realized what his presence meant . . .

Cal thought it was worth it. But his analytical brain was sometimes frightening. Even human colonization, with all its inequities, would have been better than this. Why had he set it up this way?

Everything had turned out wrong. The night of love with Veg had aborted; she knew now that she did not love him. Not that way. She had loved Orn, in a fashion—only to see him die. Such a noble spirit! Now there was only the egg.

She could not get close enough to it. She cradled it with one arm and reached under the blanket with the other, pressing her hand between its rough surface and her own abdomen. She found the catches on her blouse and released them, opening her bosom to the egg. Still it was not close enough. She worked her brassiere up over one breast and then the other, letting it cling just beneath her shoulders while her mammarys pressed against the shell. Then, almost, she felt close enough.

The fires were rising. Open flame showed in patches at the west fringe, licking at the cycads. Obviously it was not a natural conflagration; it ate too readily at green wood, consuming living fern and horsetail as well as ground debris. Tongues of it snaked out over the water, sending up goutts of vapor. No—this was the incendiary product of man, the omnivore. Like its master, it destroyed every living thing it touched, and despoiled the nonliving.

She suspected, intellectually, that Cal was right. Earth had been ready to move in on Paleo from the start, and the actions of the trio had had little bearing on that decision. Only if they had turned up some imperative reason for caution would this rape have been blunted. Carcinogenic vegetation, Poisonous atmosphere, super-intelligent

enemy aliens—one of these might have done it. But dinosaurs? They were merely a passing oddity, a paleontological phenomenon. Animals.

Animals. Suddenly she realized what it meant, this fire, in terms of life. Of feeling. This was not merely the destruction of an anachronism. These were living creatures.

Veg and Cal beside her had field glasses, and both were using them silently. She was occupied with the egg, her naked flesh embracing it, giving it warmth, drawing some subtle comfort from it. She would not be helped, Paleo would not be saved, nothing useful would be accomplished, were she to witness the enlarged optic details of the fall of the reptile kingdom. She needed no glasses. She saw the distant orange flickering, the smoke smudging up, and that was already too much. The camps they had made, the raft, Orn's body . . . everything, incinerated at the behest of the omnivore.

She turned about, glancing at Charybdis to the south—and saw the smoke there too. They had not overlooked any part of the enclave! Yet she had not seen any agents traveling about to start those devastating blazes.

The water rippled. Things were swimming past, outward, fleeing the heat, though surely there was nowhere to go. Fish, reptiles—and the latter had to come up for air. Ichthyosaurus with the monstrous eyes? No, this was a paddler, Elasmosaurus. The same, perhaps, that she and Orn had fought. Was that a scar on its neck? Was it blind of one eye?

It passed the ship, hasty, frightened, pitiable.

Fire bathed it. The reptile struggled in the water, burning, dying, and the odor of its scorching flesh was borne to her across the brief distance between them. She did not need to turn to see the agent with the

was nothing—nothing more than the convenient battleground. There would be a million enclaves, a billion Paleos, and trillions, quadrillions, quintillions of *other alternate worlds*. That was what the confirmation of the parallel worlds system meant. He had known, despite his earlier words to Aquilon, that it could not be the paradox of time travel. Paleo had to be one of an infinite series of parallels, each differing from its neighbor by no more than an atom of matter, a microsecond of time. The two went together, space and time displacing each other in a fixed if unknowable ratio. No alternate world could match Earth *exactly*; no two alternates could jibe precisely, for that would be a paradox of identity. But they could come close, *had* to come close—and Paleo and Earth were close (or had been, prior to the crossover), almost identical physically, almost identical temporally. Even though to man's viewpoint sixty-five million years was not close, and an intelligent flightless bird was not close. Such distinctions were trivial, compared to those between potential other alternates.

Perspective. If Aquilon liked Orn, she could find millions like him, in those quintillion other frames of reality. And millions of other Aquilons *were* finding those Orns.

Yes, it was vast. A sextillion worlds, each complete in every detail down to the atomic level. A septillion worlds, octillion, nonillion, decillion—there were not numbers in the mind of man to compass the larger reality. Infinity trailing behind Earth, ranging back to the age of reptiles, the age of amphibians, the age of fishes, the age of invertebrates—all the way back to the primeval formation. Millions of contemporary Earths discovering millions of Paleos, raping them . . .

Sooner or later those parallel crossings

would intersect, and Earth would meet Earth with an insufficient spacing between them. A decade perhaps, or a minute—and there would be unique war.

Better that this Earth ravish this Paleo, delayed by the manta. Better that the lesson be learned that way, now. Coexistence had to be learned, and the very hardest coexistence was with oneself. Earth might get along with an alien world, but not with another Earth. The rivalry would be too immediate, too specific. Without bloody experience of the Earth-Paleo nature, the later and major confrontation would be disastrous. As the three-year-old might fight with the two-year-old for a favored toy, and gradually learn to interact more reasonably, so Earth would fight with Paleo.

But it remained hard to abide, the brutality of this first meeting. If only there were some way to come at maturity (individual, species, world) without passing through immaturity . . .

Memory. It began far, far back in the half-light, wetter and warmer than much of what followed. He floated in a nutrient medium and absorbed what he needed through his spongy exterior. He reached for the light, a hundred million years later, needing it . . . but brushed against the enclosing shell and was restrained. He had to wait, to adapt, to grow.

There was warmth, but also cold. He moved restlessly, trying to achieve comfort, to get all of his suspended body into the warm section of his environment. And he remembered that too: somewhere a billion years ago he had struggled between freezing darkness and burning light, and satisfied his compelling hunger by growing into an absorptive cup, a cylinder, a blob with an internal gut; by extruding fins and flukes and swimming erratically after game. He formed eyes, and gills, and a skeleton,

and teeth, and lungs, and legs.

Ornet remembered.

Postscript: Calvin Potter

THE Cretaceous enclave of a world otherwise representative of the Paleocene epoch of Earth captures one of the more remarkable episodes in the history of our planet. For more than two hundred million years the reptiles dominated land, air and the surface of the sea; then abruptly all but a few forms vanished, vacating the world for the primitive mammals and birds.

Quite a number of theories have been advanced over the years to account for this "time of great dying" but none have been completely satisfactory. It has been suggested for example that "racial senescence" was responsible: the notion that species, like individuals, gradually age and die. No evidence supports this, and it fails to explain the survival and evident vigor of reptiles such as the turtles and crocodiles, or the much longer tenure of creatures like the horseshoe crab. Another theory was pandemic illness: perhaps a plague wiped out most reptiles without affecting mammals or birds or amphibians. Apart from the fact that disease simply does not work this way—it can decimate, but seldom exterminate, a widespread and varied population—the gradual diminution of numbers of species in the late Cretaceous argues against this. Why should it attack one species at a time, then later strike many others simultaneously? Various types of catastrophes have also been proposed—solar flare, worldwide flood, etc.—but again, the selectivity of such an occurrence is not explained, and no record of it is found in relevant sedimentary

deposits. The rocks show an orderly continuity from Cretaceous to Tertiary, wherein the great reptiles disappear and, later, the small mammals appear. The changeover could not have been violent.

More recent theories have been more sophisticated. Did world temperature become too cool for most reptiles, so that they gradually became torpid and unable to forage effectively? This would account for the survival of the warm-bodied mammals and birds. But a substantial cooling would have been necessary, and there was none at the time, as illustrated by plant life. Could the opposite have happened: a devastating heat wave? Again, the record denies this.

Radiation? A science fiction writer suggested that fluctuations in Earth's magnetic field should periodically permit the planet to be bathed in increased radiation from external sources, increasing the mutation rate of animals disastrously. If a magnetic lapse occurred when radiation from a nearby supernova struck, there could indeed be biological havoc. But why only among the reptiles and certain sea creatures? Radiation is one of the least selective forces.

There was a radical change in vegetation during the Cretaceous period. The angiosperms—flowering plants—suddenly became dominant. Did the herbivorous dinosaurs find the new vegetation, particularly the grasses, too tough to chew and digest? Another science fiction writer thought so. But this plant revolution came before the extinction of the dinosaurs, and many of the hugest reptiles flourished for millions of years amid the flowers. They were able to adapt, and the dental equipment of *Triceratops*, for example, shames anything developed since short of a lumber mill.

Could the mammals have competed so strongly with the reptiles as to exterminate

them? Direct physical oppression seems an absurdity, for the dinosaurs held the mammals in check quite readily for a hundred million years. One has only to visualize a pack of mice attempting to bring down *Tyrannosaurus*. Mammals might, however, have eaten reptile eggs—but again, it is strange they would wait so long, then be so completely effective. The swimming reptile *Ichthyosaurus* gave live birth, so should have survived. And why did the land-laid eggs of the turtle and crocodile escape?

No—to comprehend the decline of the great reptiles, one must first grasp the geologic cycle of which they were a part. No form of life exists in isolation, and evolution and extinction is never haphazard. Definite conditions promoted the ascendance of the reptile orders while suppressing the amphibians and mammals. The later reversal of these conditions demoted the reptiles in favor of the mammals and birds. The dinosaurs were doomed to transience by their very nature.

The surface of the Earth has always been in motion. One facet of this is termed "continental drift." The continents owe not only their positions but their very substance to the convective currents of Earth's mantle. This turbulence brought up the slag and guided it into floating masses that accumulated considerably. Though normally separate, at one point several came together to form the segments of the supercontinent, Laurasia/Gondwanaland.

Such a situation has occurred more than once in the past. It is marked by a particular complex of phenomena: subsidence of mountains, the intrusion of large, shallow bays or inland seas, diminution of tremors and volcanic activity, and extraordinarily even climate. In sum: a very quiet, conducive environment for life.

In-such case, the competitive advantages

of amphibianism or internal temperature control are academic. When the temperature of land, water and atmosphere at sea level varies only ten to twenty degrees Fahrenheit, day and night, season to season, century to century, warm-bloodedness is a complication irrelevant to survival. Indeed, it may be moderately detrimental, since it requires a higher rate of metabolism and therefore makes food intake more critical. The mammals perfected this control, involving the development of a hairy covering (to retain body heat), compact torso (same), sweating mechanism (to cool that compact furry body when necessary), improved teeth, limbs and posture (to hunt and feed more effectively, to meet the demands of increased appetite), live birth (because infant exposure would be fatal), and sophisticated internal regulatory mechanisms. But while the mammals struggled through the innumerable false starts and the tens of millions of years necessary to accomplish all this, the reptiles were simply growing large and savage. The birds undertook a similar program, and were similarly overshadowed by their flying reptile cousins.

Thus developed the age of reptiles, extending from the Permian period through the Triassic, Jurassic and Cretaceous: two hundred and twenty million years. The reptiles were not as complicated as the birds and mammals, but they dominated the world-continent.

But eventually this tremendous land mass began to break up, as the convection currents formed a new pattern. North to south, east to west, the continent was sundered. The Americas were shoved away from Europe and Africa; Antarctica broke from both, and from Australia. A crack in the land widened into a chasm, to a strait, to a channel, to a bay and finally to a sea: the Atlantic ocean. This was no overnight

occurrence; it took millions of years. Though there were many severe tremors associated with the upthrusting of matter through this rift and the other rifts of the world, they posed no immediate threat to life on land. The severance of the Americas became complete just before the end of the Cretaceous; the other continents at other times, but geologically the fragmenting was rapid.

The consequences of this breakup were multiple. The ocean floor was resculptured, disturbing ancient breeding and foraging grounds. Enormous quantities of continental debris were dumped into the oceans, for a time affecting the chemical properties of the water. Volcanism was restimulated, affecting the atmosphere. And the motion of the fragments brought about stresses leading to new orogeny: tremendous mountain ranges like the Rockies/Andes, that remade weather patterns and dehydrated inland plains. The physical restructuring of the world inevitably brought about a shift in climate, and this in turn affected life.

The plants reacted massively. Forms that had been minor suddenly had a competitive advantage: the angiosperms, or flowering plants, that did not leave their reproduction to chance. The increased winds and mountains and oceans and deserts worked against random fertilization. The older gymnosperms did not become extinct, but assumed a minority role in the new ecology.

This change in vegetation necessarily affected the animals. The arthropods—chiefly the insects—radiated astonishingly because of the offerings of the flowers, and the spiders followed them. The insectivores—mainly mammalian and avian, together with the reptilian lizards and amphibian frogs—multiplied in response, for this food supply seemed inexhaustible.

The large reptiles were only indirectly affected. They were not insectivores, and even the flying ones were adapted to prey on fish, not flies. Reptile herbivores were capable of adjusting to the new foliage, or surviving in reduced numbers on the less-plentiful old-style plants. The variety, but not the vigor, of their species declined, while the carnosaurs continued much as before. But their young began to be crowded by the burgeoning other life. Full-grown mammals and birds, hunting in packs or flocks, began to deviate from their normal diet and prey on newly-hatched reptiles, and so added a factor to the ecological balance. This was an annoyance rather than a calamity, for even new-hatched reptiles were more than a match for most other species, but it presaged the new order.

The revised geography struck far more specifically. The ponderous ornithischians could not thrive in steep mountains or dry deserts or icy wastes, and were restricted by the violence of the landscape. As these untoward conditions developed, they migrated from large sections of the new continents, and the carnosaurs of course accompanied them. The disappearance of the vast continental seas and swamps severely limited the range of the massive sauropods and the paddlers of the shallows. Unkind wind patterns ravaged the pterodactyls. But many suitable places remained, and the net effect of the change was to concentrate the reptile orders in smaller sections of the world and reduce their meanderings, not to bring them anywhere near extinction.

The climate was another matter. The overall temperature changed only slightly, becoming cooler. This by itself was unimportant. What counted was not the average but the range. The so-called "temperate" climate developed: actually

about as intemperate as the world has ever known. The even seasons shifted to hot summers and cold winters. An individual summer's day might range from 50° F low to 100° F high. A winter's day could begin at that low and drop fifty degrees. The reptile biology simply was not equipped to handle such extremes. A heat wave in summer could wipe out enormous numbers; a prolonged freeze in winter did the same. The warm-bodied creatures, in contrast, were ready, and only a fraction of their number failed to adapt. This, more than anything else, drove the reptiles as a group to the tropics, and reduced their territory drastically.

And here the most direct aspect of the continental breakup came into play. For the individual land masses were not contiguous. They were now isolated by deep water. *The reptiles could not migrate far enough.* North America, for example, drifted too far north to have a tropical zone, and was completely separated from South America for some time. Stranded, the reptiles were subject to the full ravages of geography and climate, and they expired. Some few survived for a time in local enclaves, but such existence was tenuous. These extremely confined areas were subject to volcanism and recurring tremors and drastic alteration by shifts in the prevailing winds or drainage. Inevitably the reptiles there were destroyed, whether in a few hundred years or a few million.

The dinosaurs could have survived all the other changes and met the challenge from other classes of vertebrates—had they been able to travel freely over the world, for there was always suitable pasture somewhere. But the fragmentation of the original land mass restricted them at the very moment, geologically, that they could least afford it. Far from being coincidence, this was inevitable. The age of reptiles on land was

finished.

The sea reptiles had their own problems. Those tied to the shallows and who laid their eggs on land, such as *Elasmosaurus*, expired with the others, for the shallows were gone. Those fully adapted to deep water, such as *Ichthyosaurus*, suffered severe competition by flourishing sharks and, more deviously, by restriction of their diet. For an earlier revolution had occurred in the water: the teleosts, the so-called "bony" fishes, had appeared. These had stronger skeletons than did the earlier types, and possessed an air bladder modified from a one-time lung that enabled them to match the density of the surrounding water and float at a given level without muscular effort. For the first time, vertebrates were able to compete specifically with the invertebrate ammonites, who for hundreds of millions of years had possessed this controlled flotation ability and thrived. The fish, however, were superior swimmers.

This did not eliminate the ammonites, but it did restrict them. When the continental breakup ravaged the oceanic geography and chemistry, the ammonites lost out. Those swimming reptiles who preyed exclusively on ammonites followed them into oblivion.

Thus, medium by medium and type by type, the life of the world was transformed by the breakup of the master continent. It was not that the birds drove out the flying reptiles, or that the teleosts and sharks drove out the ammonites and certain corals and swimming reptiles, or that the angiosperms drove out the gymnosperms, and certainly the mammals did not drive out the land reptiles. But the conditions of each habitat changed significantly, and shifted the balance to favor new species. Those forms of life that were ready for harsh extremes of geography and climate and chemistry prospered; those that were not, did not.

But what of the few surviving reptiles?

These were the ones who *were* equipped to endure the new regime. The crocodiles and turtles were able to forage either on land or in the deep sea, so neither the sharks nor severe temperature extremes could eliminate them entirely. They were able to migrate from an unkind continent to a kind one, and did so, and have lasted until the present. The duckbills might have joined them, as they were strong swimmers and fast runners on land—but they had to feed on land, so could not remain in the water for weeks at a time. The snakes and lizards were small enough, and suitably shaped, to reside on and in the ground and trees; for them the arthropods and small mammals represented

an improved diet, and deep burrows shielded them from winter's cold and summer's heat. They survived largely because they were small enough to utilize such shelter; the dinosaurs' specialization in large size worked against them fatally.

Have there been other extinctions as the continents drifted into new configurations? Certainly, many of them, though few as impressive as this one. There will surely be more. When the land moves, life must follow. The real mystery is not the great dying, but why this natural course remained a mystery for so long . . .

—Piers Anthony

(CONTINUED FROM PAGE 15)

energy.

In short, politics. Compromises.

The door slid into the recess in the walls. Five men single-filed in. The President weighed each in the balance, anticipating his arguments and visualizing the bait

(CONTINUED FROM PAGE 26)

can't, it's worth considering that a man can be in pretty sorry shape and still carry out a routine he's used to, especially if he's drilled at it until it's second nature. But he's not going to work out too many abstruse problems when he's in the particular state *I'm* thinking of.

"Just what grip can this field get on us if the *nerve-tracts necessary to work mathematics problems can't function?*"

Well, Sam. I think you get the picture. We drilled day and night from then till we neared the end of that leg of the trip. When the time came, the spider lines were a nightmare, but even seeing double from the captain's potjack, we still had the routine down so solid that we were able to reel in the cargo section, make the sub-space jump, and then cut the section loose on the far side. As for the INSTIM units, believe me,

which he would grab even if he saw the hook.

He said, "Gentlemen, be seated, if you wish."

He looked at his watch and began to talk.

—Philip Jose Farmer

there was no handle for them to get hold of us by. That mental level was out of action.

As for how we felt *afterward*, let's not even think about that. We were still hung over when we got back to the loading center, but the captain explained it to the Old Man, and everything was okay. We'd met the contract, and that was all he cared about.

The ship even got renamed, and I suppose it's an improvement. But *Bunglers All* was bad enough to have to explain to curious outsiders. How are we supposed to explain *Drunk in Line of Duty?*

There's got to be a way around this somehow. Anything you might suggest, Sam, would be welcome.

As ever,

Al

—Christopher Anvil

Mr. Bowen's Wife Reduces

A Classic Reprint from AMAZING STORIES

By MILES J. BREUER, M.D.

This is a story of a little man with a wife who did not share that peculiarity.

THE speeding Ford V-8 never wavered an inch from its set route, even though a tremendous disturbance had taken place within it. Only Mr. Bowen's knuckles paled as his hands clenched the steering-wheel with unusual tightness, when, upon looking into the driving-mirror, he saw the sooty smudge on his collar, from his wife's fingers.

Mr. Bowen, in spite of all euphemism, would frankly have to be classified as a small man; five feet three inches and a hundred and ten pounds. He was also dressed with the most fastidious perfection. Every fold, every crease in the right place, not a speck of dust, colors and shades all correct, linen immaculate, except for the horrible smudge (one centimeter in diameter) on the wing of his collar. Furthermore, Mr. Bowen had a quick way about him, the way his eyes moved, the quick gestures of his hands, the way he handled the car.

His disturbance on beholding the gray smudge on the immaculate collar consisted of a silent seething, in which loathing and confusion were mingled. His foot went down on the clutch; the other foot approached the brake pedal. However, the barely perceptible and momentary slowing of the car smoothed back out into its swift progress toward town. For a moment it had occurred to him to drive back home and change his collar; but there was something about the idea that instantly repelled him.

He therefore stopped at a men's furnishing shop as soon as he reached the business district, and bought himself a new collar. Then he clenched his fists, cleared his throat, pondered a moment; and then went to the telephone and made an appointment.

* * *

"It's driving me crazy," he said to Mr. Leitz, of Hemingway, Dufay, and Leitz, Attorneys, pacing back and forth in their office.

"When I married her, she was trim, neat and vivacious!" he exclaimed.

"Now she weighs two hundred and twenty pounds, and is not even bright," he continued as the attorney waited.

"Not even clean!" he said with a shiver.

"Can't even see that she is driving me nuts. Thinks everything is all right."

"She is that stupid," he added, warming to his complaint.

"Always messing up everything for me. But cunning enough to see me look longingly at slim and lively girls, and to keep a fierce guard over me. Why, I'm practically in custody."

"Once we were happy together."

"Am I going to lose my reason?"

Mr. Leitz was a human sort of person. He did not jump at once to the idea of a divorce, as would have many a mercenary and unfeeling lawyer. He was sorry for the slow and unwieldy Mrs. Bowen, and did not like

to think of her being kicked out in her unfortunate condition; not even to save Mr. Bowen's alleged reason. (Besides, Mr. Bowen did not look well enough off for a fat divorce fee and a pile of alimony.)

"Say, Doc!" he called up a medical friend of his. "Would you like to prevent a divorce?"

"Sure, Joe," the doctor replied, "if there is any chance of beating you out of a case."

He listened to the lawyer's tale, and then asked to see the lady.

"Dr. Hanot is a very brilliant man," said Joe Leitz to Mr. Bowen.

Mrs. Bowen followed her little husband stolidly along to the doctor's office, and submitted placidly to the quiz. She was undisturbed by having to lie on a high bed and have a trim and magnificently neat technician fasten things into her mouth for a test on some sort of machine. She took everything as it came, and offered no comment. Mr. Bowen hopped and twittered about the place, now here, now there, like some brilliant and nervous bird.

Even the needle in her arm did not disturb Mrs. Bowen.

"Substance recently isolated from a gland in certain animals," the doctor explained. "Injection once a week. Please be back next Thursday at 2 o'clock."

At the end of the first week, Mr. Bowen was overjoyed. His wife had lost two pounds. His nimble imagination could already see her rapidly becoming her old, neat, slim self again; and he almost wept with joy. As he thought of the happiness that would bring him, and of the suffering he had gone through in the past two or three years, he became almost hysterical in his joyous anticipation. He was expansive as he drove his wife to the

doctor's for the second injection. She hardly seemed to notice what he said.

During the second week, Mr. Bowen watched his wife anxiously every minute of the time. He could hardly contain himself from taking her to the scale and weighing her several times a day. At the end of it, three more pounds were off; and as he took her for the third injection, the world already seemed a different place.

At the end of the fifth week, Mrs. Bowen was definitely smaller. It could be seen at a glance. She was really smaller.

But there seemed to be something wrong about the whole proposition. Her figure was not getting graceful. Driving along in the Ford V-8 one day, far from home—he was a traveling salesman for a notion house—he reasoned it all out, and it dawned on him that the drug was reducing his wife's stature as well as her girth. She was getting smaller in all dimensions.

He turned right around and drove back to his home city, and hurried up to the doctor's office.

"Don't give her any more of that stuff!" he exclaimed to the doctor.

The doctor patted him on the back.

"She was in about an hour ago and got her last shot," the doctor said. "Now, don't worry; she'll be all right."

Mr. Bowen left the doctor's office, as most of us do, superficially convinced and internally torn by doubts and fears. There followed for him weeks of mental torture which were far worse than those previous months when he had feared he was losing his mind.

For, as he watched her day by day, his wife continued losing weight—and growing smaller! Before his eyes, she grew literally smaller; she

was becoming a dwarf. Finally, when he thought he could stand it no longer, he rushed in terrified desperation to the office of Attorney Leitz. His torrent of anxious words alarmed the lawyer, and he accompanied the confused and anxious little man to Dr. Hanot's office.

Mr. Bowen did not remember getting any satisfaction out of either the lawyer or the doctor. They both patted his shoulder in turn. At the moment their explanations seemed satisfactory, and he went out of the office reassured. However, the moment he was in his car again, the doubts began to return. It was all very suspicious. It seemed that they were conspiring against him, and trying to talk him out of something that he could see with his own eyes. Perhaps the two of them were in conspiracy with his wife. When he got home again, there was his wife, the size of a nine-year-old child.

IN another six weeks of agonizing mental torture for Mr. Bowen, (during which however, he managed to get about and get orders for notions) she was only two feet high. The devastating thing about it was that Mrs. Bowen did not seem to realize that there was anything wrong or out of the way about the whole business. She insisted on going out to dances and parties with him and mortifying him. She seemed to take especial delight in being with him among people, which made him shiver in shame. He was conscious of every one staring at his dumpy, waddling companion, tiny, down near the floor beside him. Always it seemed that he could not live another minute. It was always a relief when they got home and closed the door behind them on the outside world. There was no use in protest-

ing to her, nor to anyone else. He bore it in silence.

It finally came to the point where he refused to go out with her. She was too small. It was odd that she herself did not seem to pay any attention to her small size, nor to be put out about it in any way. If anything, she was more sympathetic with him since she had become tiny, than she had been previously. But, it was all very horrible for Mr. Bowen. When she was only three inches high she was still two inches wide. How could he go about outside, with her that way? Not only did it look impossibly silly; but something might happen to her; he might even lose her.

He did lose her. One day he rushed wild-eyed and dazed into Mr. Leitz's office.

"I have lost her!" he shrieked.

"She got so small, I couldn't see her," he replied to the lawyer's inquiry. "She must have slipped into a crack somewhere, and fallen—"

"She just got so small, I couldn't keep track of her."

The lawyer tried to comfort him, and spoke empty words, that it would come out all right. It was all very conventional comforting, but it was not at all to the point, and did nothing about the fact that Mrs. Bowen had gotten so small that she had disappeared.

"But, they will accuse me of murder. They will think I made away with her," Mr. Bowen urged, wringing his hands.

"Nobody thinks that," the lawyer smiled. "Besides, unless there is a dead body, no one can prove a murder, you know." He did not seem to take the matter very seriously, it seemed to Mr. Bowen.

"Nobody believes me," thought Mr. Bowen.

Oddly enough, though, he felt somewhat consoled as he went out of Mr. Leitz's office. He went to his lonely home, and wept for his vanished wife. Disconsolately he read the evening paper. But there the headlines told him about an Ohio minister burning his wife's body completely in the furnace; but later the deed was proved against him by the identification of the gold from her teeth. Mr. Bowen was in a sweat of panic again.

Then there was a knock at the front door. Already they were after him! He went out of the back door, and ran.

He fled out of the city to the mountain. It was a beautiful mountain, several miles away, in plain sight of the city. It was one of the "sights" of the city. He had often admired it: the play of the sunrise behind it and of the sunset upon it; the change in colors from the greenness at the bottom to the blue at the top; of the mysterious valleys and peaks below the highest soaring point that was always fringed with white, fluffy clouds.

He had often meant to go to this mountain; just to explore around in a leisurely way, some time during some lull in his busy life. But he had always been busy; the lull had never come. A multiplicity of details absorbed his life. They prevented his doing big things or enjoying himself, and yet after they were all done, of what value were they to anyone. This was the long wished-for lull. Now he would use it to explore the mountain.

When he reached the mountain and was upon the side of it, it seemed still more beautiful. He loved the green of the trees, the grass in the lower parts and the pine woods above. He loved the sparkle and plash of the brooks, and the crunch of stones under his feet.

He spent hours wandering around,

merely enjoying himself, drinking from the streams. He heard no sounds of pursuit, and forgot the possibility of it, until he lay down to rest beside a stream that wandered among the pine trees. Then there were voices in the distance. Again he got up and went on.

He came to a tall, steel fence that stretched impassable across his path. Through it he could see a park-like estate within; it was even more beautiful in there than without. He turned to the right and followed the fence, until he came to a stone gate which was marked: "Private Estate of Andrew Clayton."

ANDREW CLAYTON was a chain-store magnate. Mr. Bowen had met him personally in a business way long ago. At that time Mr. Clayton had been friendly and genial. He had said:

"If you ever pass my place, I want you to stop in, and we will shoot some pheasants."

At the time he had not believed that the big man had meant it; but he had in the meanwhile often imagined himself shooting pheasants with the man who owned half the chain stores in his territory.

On the gate, there was a button to push, and a transmitter to speak into.

Servants graciously conducted Mr. Bowen into the presence of the magnate. Mr. Clayton was glad to see him, and made him feel at home at once. He did not even inquire how Mr. Bowen happened to be up that way. He suggested pheasant-shooting quite promptly. It seemed that all these years, he had been expecting Mr. Bowen. In the afternoon, Mr. Clayton took Mr. Bowen and two other gentlemen pheasant-hunting in the wire enclosure, which seemed to cover

many square miles. Mr. Bowen was happy because no pursuers could get in there.

The next day, Mr. Bowen decided that he ought to leave.

"I've had a mighty good time," he said to Mr. Clayton. "But I must not be a burden on you, and I've got to get along."

"If you are really enjoying yourself, why hurry away?" Mr. Clayton urged.

"How long do you think I ought to stay?" Mr. Bowen asked, nothing loath.

"Why decide upon that now?" Mr. Clayton solved it simply.

So, he stayed happily on. There was tennis to play. How hungrily he had wanted to play tennis since his student days! He sat languidly in the afternoons and read books which he had been longing to read for many years, but had been too busy. Life had been a constant drive. Always he had had to do what other people did or what other people wanted him to do, and never what he liked. Here was a chance for some relaxation.

Mr. Clayton's servants were remarkably intelligent and capable people. Mr. Bowen had never been used to having servants do things for him, and to be looked after in smallest details. It was all very gratifying, and made him feel quite important and big.

Mr. Clayton and the house guests were charming. This was Mr. Bowen's opportunity to cultivate the ladies, and he made the most of it. A great hunger was fulfilled in him, in just being able to sit about in a leisurely way and talk to them,—especially in the evening on the big veranda with no lights except the moon. They looked thrilling and charming in light-colored wraps.

Days and nights passed. He tried to count them, but desisted. Why worry with counting, when other things occupied his attention. The big thrill came several nights after he arrived. One of the ladies agreed to walk with him in the evening by moonlight. Ever since the middle of the afternoon, when they had agreed on the evening walk, his heart bounced away at high speed. She was a very charming lady, about twenty-eight years old, with a most winning smile and an engaging way of talking about everything. She was very beautiful, slim, and *petite*.

It was a beautiful walk at night with the big round moon over the black pines. All round was the security of the steel fence, to keep out intrusion and trouble from the Outside.

The next afternoon they walked again. She was neat. She smiled. She was interested in him and considerate of him. Again he caught a glimpse of the steel fence. By daylight the thoughts it aroused were different. It made him worry about the time he must think of getting away from here; he could not continue to impose forever on Mr. Clayton's hospitality. He would have to go away. Where would he go?

Then came the thought of his lost wife. The jerky feeling in him changed his mood. But Mrs. Bowman did not even ask him why he felt so sad. She seemed to understand. She understood everything.

He did not want to go home. He wanted more days to talk to her; and many evenings. He loved her by the light of the moon. He asked her for another evening at once. That was nerve! However, she was happy to give it. She was a most friendly lady. Again the thought of his wife barged

in, her unwieldiness and her persecution of him. He realized that he was glad that he was not at home. He was glad that she was lost. But on top of that he was worried with thinking he was doing wrong.

In the evening he told Mrs. Bowman that he disliked to think of going away, but that he must no longer continue to take unfair advantage of Mr. Clayton's hospitality.

"Perhaps we shall meet again."

"Do not worry, and try to be happy right now," she said with her bright smile, and seemed quite satisfied about it all.

She was very beautiful. What a contrast to his fat, stupid wife! He realized now how he had really hated his wife, but had refused to admit it to himself. That world back there was indeed a most tragic, difficult and confusing place. He wished that he could stay on at Mr. Clayton's forever. There were some of the guests at least, who seemed to be staying as long as he was.

TIME passed. Mr. Bowen did not know how much. It must have been weeks, though, for here was another evening with a full moon over the black pines. They were beautiful weeks, out of which he had spent with Mrs. Bowman all of the time that men and women guests could find opportunity for being together. When he was in his own room, he could hardly wait for the time to come when he would see her again.

At the same time, thoughts of his job back there in that world came to torture him. The idea of having to go back there brought a sort of terror with it. He knew that if he tried to explain how he had lost the wife whom he had disliked so much, no one would believe him.

There was no question that he was in love with Mrs. Bowman. Of course, such a thing must not go on. His mind was fully made up to that. He could see that she also liked him, and he could not permit her to drift into some kind of a shady affair. He was no kind of person for an honorable woman to be mixed up with. The sooner he broke it up the better it would be for both of them.

It took courage. However, he felt stronger now. He was rested. He was not nervous any more. He was able to stand up and go back and face the music. He would go to the police and tell his story and face the consequences.

"I'm a sort of murderer," he said to Mrs. Bowman, in his effort to explain why he must go away.

"I've killed my wife. Not exactly killed her, but it was my fault that she got lost and disappeared. I did not take the proper care of her. It was all my fault that she got so small."

Mrs. Bowman looked beautiful, but said nothing.

"The companionship with you has been wonderful," he said to Mrs. Bowman. "I hate to leave. But I've got to. I'm going. I shall never forget your kindness."

She still did not say anything, but listened and looked at him with wide-open, amazed eyes. That made it harder for him to go. He could see that she thought a great deal of him. He could even see that she did not want to lose him.

"Don't you want me to go?" he asked.

She shook her head, and a strange light came into her eyes. That made him still bolder.

"Do you mind very much that I fell so foolishly in love with you?"

"No!" she breathed, scarcely audibly. "I have been waiting. A long time."

Mr. Bowen was dazed. Things whirled with him.

"I love you! I love you!" he exclaimed, and repeated it many times, and held her hand in two of his and gazed at it intently, as if in that pale hand lay the answer to all his puzzles.

She seemed happy and pleased, but could not speak.

"Let us both go away tomorrow. Together. And do things!" He held his breath awaiting her answer.

"Yes!"

Radiantly, she spread her arms wide for him.

A strange thing happened to Mr. Bowen. His brain swam. Things clouded and changed about him. He was not unconscious. The change was all in the outer world. Then, suddenly, everything cleared. A wide, solid bridge seemed suddenly to extend back to the morning when he had found the smudge on his collar in the driving-mirror of his Ford V-8.

There was his wife in the room with him. But it was the slim, bright-eyed girl, full of laughing life, whom he had first married. She was smiling at him with a mist in her eyes,—not the fat and sluggish creature who had haunted his recent months, but the beautiful wife of his romantic courtship days.

The room was a simple sitting room, somewhat like a hotel room. Outdoors was a park, grass, trees, flowerbeds; like nothing that he could remember ever having seen. There was something queer about the windows. There was a network on the outside. It was a network of heavy steel wire. When in a moment Mr. Clayton came

in, he looked so thoroughly a physician, that there could be no question about it.

The actual steps by which the truth percolated into Mr. Bowen's mind were long and tedious and not interesting to tell about. In his memory the realization still seems a sudden transition rather than a slow development, and it is better that way. For, there never had been any mountain near the city, and Mr. Clayton's estate was a mental sanitarium. Mr. Bowen was now well and cured; but his enjoyable vacation with Mr. Clayton, who was really Dr. Beaton, the well known psychiatrist, was a period of treatment for a genuine mental breakdown.

"But you!" he exclaimed to his sweet and most adored wife. "That terrible—weight—and sluggishness! Certainly that was no illusion?"

"No," she replied. "Dr. Hanot recognized it at once, as a disease that is well known to medical men: hypothyroidism or myxedema. A little gland in the neck here—" her hand was inexpressibly graceful as she indicated her curved, white throat—"falls behind in its function. But it is easily cured by injections of an extract of the same gland from sheep."

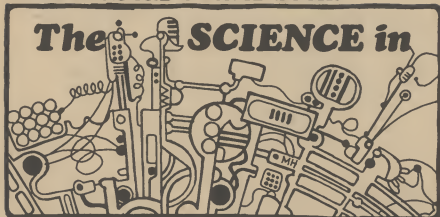
"You poor dear," he said. "You've had a terrible time."

"No," she said, laying her hand on his shoulders; "you are the one who has had the terrible time. Dr. Beaton says that your illusion of my growing small was merely a symbol of what you thought of me, and what you wished — especially when I disappeared in a crack in the floor."

Dr. Beaton shook hands with him.

"Your company is anxious for you to get back on your territory," he said. He was an excellent psychiatrist.

GREG BENFORD & DAVID BOOK:



SCIENCE FICTION *

WHAT YOU EAT YOU ARE

"Life is in the service of life," says Frank Herbert in *Dune*. "Necessary nutrients are made available to life by life in greater and greater richness as the diversity of life increases. The entire landscape comes alive, filled with relationships and relationships within relationships."

"Life is in the service of Man," says your neighborhood supermarket, scion of two thousand years of western civilization. "No deposit, no return."

Which view is right? Are we lords of creation or just another species? The human race stands ready to launch rocket ships that will conquer new worlds, only to find that heaps of garbage and old cars threaten to pour over the launching pads. People who should have known better are suddenly surprised to learn what has happened to our planet, our rivers, our air.

What makes Earth congenial to us? A description of our natural environment involves a long list of factors: climate, composition of air, availability of edible plants and animals, and so on. But this list misses the point. Man, plants and animals, and Earth itself have adapted through evolution to one another. Taken all together, they are a single system.

System. That's the key word. No part exists in isolation from the rest, so we can never study any species of plant or animal all by itself. How would it get food or air? When we consider a single species, we consider it inside a subsystem—a culture or a cage or a lonely island—and hope that the connections with the rest of the life system are unimportant. But it's very hard to be sure about this. Raising bacteria in a culture medium changes their life style by eliminating competition, making things too easy for them. Animals in zoos (pandas, for example) don't breed properly because they can't get everything they need in a cage environment. The act of observation upsets

nature. Eyeless cave-dwelling fish that are used to perpetual darkness can't be studied by simply turning on floodlights in the cave, because the fish sense them as a source of heat.

The study of how the different parts of the life system interact is ecology. The problem of observing living organisms without changing the way they live is a special case of the basic rule of ecology: you can't do just one thing to the life system. Every change in part of the system affects other parts. Back in the days when "ecology" was spelled "oecology," few people realized that this rule applies to mankind as well. But we're learning now, with a vengeance.

Man is tied to Earth by adaptation. Even on Earth, conditions are tolerable only within narrow limits. The prevalence of smog in and near large cities shows how narrow these limits are. Twenty-five parts per hundred million of ozone in the air causes serious eye irritations; twice that makes the death rate from emphysema rise sharply.

Man's ties to the planet of his origin are particularly clear in his food. We don't eat just anything. We can eat only a few of the special classes of organic compounds called sugars, starches, fat and proteins. Most other types are useless or even poisonous. Other classes of organic chemicals are worse yet. And inorganic compounds, those that aren't made of molecules with multiple carbon atoms, are hopeless. If we had to depend on chance to find what we need, we wouldn't be around long. But we have something better.

Remember, all life forms on Earth are part of the same system. They interact, and that implies a certain degree of chemical compatibility. All life forms, plant and animal, are organized out of cells. And all cells function in basically the same way.

They have the same general structure. They take in food, use it, and excrete waste products. They reproduce.

Everything eats and, sooner or later, is eaten. Organisms cannot evolve into a mode of existence so different from the rest of the system that their food-utilization apparatus is unable to deal with their food. And this has always held true.

The first primitive organisms lived on organic materials floating in the sea. There was a very simple balance between food supply and organisms. But the simple one-celled organisms had a capacity to evolve. They reproduced, and sometimes a change (a mutation) occurred spontaneously. If the change helped its possessor to survive, that increased the chances that it would pass the new characteristic on to its progeny. If the characteristic proved to be counter-survival, there were no progeny. This is natural selection.

Natural selection can only proceed by small changes. A big change would destroy the precarious orderliness of life, and besides, it might result in an organism incompatible with its environment. An animal too far ahead of its time would necessarily perish. Life forms diversified, specialized and became more complex. But each change tended to add a new stage to an already existing chain of functions.

For example, there are indications that in primitive times a substance called ATP (adenosine tri-phosphate) existed naturally in abundance. It served as a kind of concentrated high energy food, instantly available. Later on, the supply of ATP became inadequate, or organisms came to prefer alternative energy sources. Instead of utilizing these alternative sources directly, though, they had to convert them first to ATP. Later still, some adapted to new food supplies, which they had to convert to the substitute food, which then was converted

to ATP. Each step imbedded the existing chain in a longer one. The longer the chains became, the more indispensable became ATP, because replacing it would mean reorganizing the whole arrangement. Now, after a billion years or so, ATP is a kind of energy currency common to all living cells. When a cell extracts energy from food, it goes into ATP. When energy is needed to make a reaction take place, it comes from ATP.

We can study these chains of chemical reactions in living cells. Each link in a chain has a specific purpose. Most of them are intermediate steps: products of earlier reactions go to make a new product, which will be used in the next step, and so on. The reason the chains are so long is that cellular chemistry operates just one step at a time.

These chains can be traced back to the substances the organism takes in from outside, i.e., its food. Basically, food serves just two functions: it provides energy and supplies structural material for building and repairing cells. Any substance used for neither of these purposes is not food.

Cell chemistry, the chemistry of life on Earth, is very specific in its requirements. Almost right usually isn't good enough. But, as sf writers never tired of telling us in the early days, all these requirements are characteristic of Life As We Know It. What about Life-As-We-Don't-Know-It?

Obviously, we don't know what it eats. But we can be nearly certain that we can't eat it. Even if alien life forms belonged to a multi-species ecological system, based on carbon chemistry and evolved on an Earthlike world, they would be too different. Our life system has evolved along a course like the path through a maze with billions of wrong turnings. Near the start, for instance, our ancestors could have got hooked on ADP (the D stands for "di") instead of ATP. Bang, a whole new biology.

Or later, they could have gone for strontium instead of the chemically similar calcium, or lithium (if there were more of it around) instead of sodium. Or used a whole new set of amino acids. There are about 70 amino acids known to occur in life on Earth. Of these, about 24 are useful to higher animals. But it would be simple to "design" thousands of others. We use only "left-handed" amino acids; the mythical man from Arcturus might use right-handed ones.

The point is, every alternate path leads to an entire new life system, like ours but incompatible with it. The odds against making the same "choice" of new mutations, one by one, through the whole history of evolution, are bigger than astronomical.

But the first thing the average sf star voyager does when he hits dirt on a new planet is shoot and eat the local equivalent of a jack rabbit. If he's the cautious type, he tried it out on a domestic pig first, like Heinlein's space explorers in *Time for the Stars*. This is absurd.

After all, what does Man eat on his native planet? (When he can get it, that is.) To answer this, we visit the supermarket, symbol of abundance and waste, and make a survey. A typical market carries food made from over 40 animals and 200 plant species. (These are conservative counts.) How much of this do we need?

The average adult needs at least an ounce of protein daily, depending on his size and degree of activity. Not just any protein, either. A protein molecule is made up of strings of amino acids, tied or tangled together. Ten amino acids are "essential"; the human body can make up the others we use out of these, but the ten essential ones have to come from outside. A protein is "high-grade" if it contains all of them in fair abundance; it is low grade if some are missing or in scant proportions.

The concept of essential amino acids requires clarification on one point. Our food actually has to have only eight of the ten. Bacteria living in the intestinal tract—called “gut flora”—usually manufacture the other two from these eight in sufficient number for our needs. This kind of symbiosis with gut flora is typical of the higher animals—vertebrates, insects, and the rest.

Likewise, all have much the same basic amino acid requirements. The digestive system in all higher animals works the same way. This being so, their other nutritional needs turn out to be pretty much like Man's too. We—and they—need about a dozen different vitamins, a fatty substance called linoleic acid, enough sugar or starch (or fats and proteins) to meet energy needs, as well as calcium, phosphorus, salt, potassium, magnesium, and several trace minerals. Trace minerals are elements, mostly metals, of which we require only microscopic amounts per day. They include iron, iodine, and several others.

Nutritional tests have led to the recognition of minimum daily requirements for a few of these substances. If a person eats less than the minimum daily requirement (MDR) of any of them, some kind of deficiency disease eventually results. Actual diets should exceed MDR's to be on the safe side; by how much depends on the individual's activities and body type.

For most of the items on the list, no one can say exactly how much we need. Some, like fluorine and selenium, have only received recognition in recent years. There may be others awaiting discovery. Such trace requirements must be so slight that the body needs only microgram amounts to maintain health—but without them something would go haywire.

This has clear implications for anyone who tries to farm on another planet. Suppose we get around to colonizing

Ganymede. The composition of Ganymede's rocks is probably not too different from that of Earths—the moon rocks turned out to be a lot like ours—and could be ground up for use as topsoil. This is the way Heinlein suggested it would be done, in *Farmer in the Sky*.

But suppose that some trace element is missing—iodine, for instance. Some plants need iodine, some don't. But we need iodine; iodine deficiency causes thyroid failure and goiter. The MDR is .1 milligram. That is, about 40 pounds of iodine per day would be enough for the population of the entire United States.

If Ganymede had no iodine-bearing minerals where we could get them, we would have to import iodine from Earth. Not very much; a few pounds a year would keep a population of thousands going. But the problem might be a shortage of selenium, or fluorine, or something unknown for which our daily needs are even less.

Shipments of trace elements provide a slightly plausible excuse for the trading ships that ply the interstellar spaces of sf.

Here's a scenario. An agricultural colony on a seemingly earthlike new world falters after a year and colonists die mysteriously. Galactic center sends out a team of investigators. They find that the mysterious plague is caused by barium deficiency (barium is not one of the trace elements now known to be essential). So they start shipping barium, and the colony thrives. As a plot device, it's more believable than stories about planets that turn out to be entire living creatures, or plagues caused by native bacteria picnicking on our alien body chemistries.

For some species of bacteria and protozoa, biologists can maintain cultures on an artificial formula, a synthetic diet of known chemicals. They check it by

following individuals through a whole life cycle, including reproduction, for several generations, with no other food but the formula available. If no abnormalities appear, this proves the diet is adequate.

Obviously, we haven't got this kind of understanding of human nutrition yet. But if we did, it would be expressible as a list of several dozen or perhaps several hundred essential chemicals, with their MDR's. It's not too farfetched to expect such a list to be available in a few years. Similarly, it'll be possible to prepare lists of nutritional requirements for dogs, birds, grass, trees, roses, and so on. With enough work, one could make up lists for every species of plant and animal on Earth.

Now let's imagine using these lists to design an artificial ecology. We might want to plan a wheat farm for Ganymede, or a hydroponics installation for a deep space ship, or just a stable aquarium that can maintain itself without any human intervention.

Right away, there's trouble. The information in nutritional tables is incomplete. It tells what comes in, but it doesn't tell what goes out. And it doesn't tell where things come from or where they go. An organism turns everything it takes in into structural material or waste products. When it dies, its structural materials will decay and return to the life system. A proper, complete description of the system tells what happens to those waste products and decay products.

Ecology is often discussed in terms of cycles—the nitrogen cycle, the water cycle, etc. But it's actually more complicated than that. If there really were a water cycle, a molecule of water would always follow the same sequence of states, say, from water vapor in the air to rain to ground water to plants or animal tissue to rivers to oceans to water vapor, and round and round in the

same fashion. But some ground water goes into plants, some runs off to the sea, and some evaporates. Some just stays in the ground. The fractions for each possibility have to be collected in a table; a simple cyclical list fails to describe what actually happens.

This is called input-output analysis. It's familiar in economic theory. Thus, in the April, 1965, issue of *Scientific American*, there are tables that show how goods and services pass from one sector of the U.S. economy to another. All the activities which involve production of goods or services are divided into 81 different categories: apparel, engines and turbines, amusement, and so forth. It would be possible to subdivide them further, or to use fewer, coarser divisions instead, but 81 was the number chosen. These tables show how much output each sector produces and where it goes. Or, read backwards, they show where the input into each sector comes from.

A nutritional table is a linear array of quantities. An input-output table is an example of a rectangular array or matrix. Obviously a matrix is more complicated than a linear array because it describes more complicated relationships. The economic tables in the *Scientific American* article, though formidable, are really a very simple description of the economy. They are simple because all transactions can be reduced to dollars. A single standard, money, measures the effect of all sales and purchases.

A description of how an ecological system works is similar. The important difference is that all transactions cannot be measured in terms of a single commodity. Instead, there must be separate tables for water, for carbon, nitrogen, iron, and for Man's innovations: DDT, nitrogen dioxide, detergents. As with economic input-outputs, there can be many sectors or a few,

depending on how much detail one wants to include. The carbon table, for example, would probably contain the sectors carbon dioxide in the air, carbon dioxide dissolved in water, animals, land plants, aquatic plants, coal and oil, and carbonate minerals like chalk and marble. This would be adequate for studying the effects of using up fossil fuels on a global scale or cutting down all the trees in North America, but not for studying the effects of burning grass clippings from your backyard over a period of years.

So now, armed with ecological input-output tables, men can design an artificial environment. We'll begin with the simplest problem, an earthlike planet. Let's suppose it's *very* earthlike, as if our own planet had been sterilized, but the inorganic chemical composition left unchanged.

There's one trivial solution: stock the planet with all the life forms that exist on Earth. But this is unsatisfactory for two reasons. First, it's a lot of bother. Unless the whole thing is done right—oceans, deserts, everything—there is no guarantee the system will balance. Second, it doesn't really tell us anything about ecological planning. It's not a practical solution, since we're never going to find a planet that much like Earth. And since we already have Earth's ecology on Earth, why go to the trouble? This "solution" is a blind alley.

If this new environment is to support Man, it will have to provide food for human consumption. There must be a way to replenish food stocks, and even to increase them as population grows. It will have to be a simple diet, but not so simple that it's unpalatable. Pioneers are notoriously willing to undergo hardships, but correspondingly eager to better themselves.

Staples will be cereals, supplemented with beans and other vegetables. A mixture of corn, cottonseed meal, sorghum and yeast

makes up a high protein food called "inçaparine," used in protein-poor countries now as a diet supplement. Mushrooms are a likely crop also.

Green plants are almost self-sufficient. They can manage on sunlight, carbon dioxide, water, nitrates, phosphates, potash and trace minerals. (One of the important ones is magnesium, which is essential for chlorophyll.) The key to this independence is photosynthesis. Photosynthesis is an elaborate process of many steps, but simply stated, its operation turns carbon dioxide and water into sugar and pure oxygen. Subsequent steps change the sugar into starch and cellulose, and with the addition of nitrogen from nitrates, into amino acids. As with animals, the four chief elements (carbon, oxygen, hydrogen and nitrogen) add up to about 96% by weight of a typical green plant.

Mushrooms are less adaptable, being incapable of photosynthesis, but yield about 40% protein. Like yeast, they obtain energy by a fermentation process. Hence, they use up oxygen, as do animals. Mushrooms are usually grown in straw, fermented by bacteria.

Although an ecology based on a few field crops and fungi isn't much like what we're used to, it has a lot of advantages. It's efficient. Mushrooms will use decontaminated human wastes and straw from cereal crops. Yeast will grow on sugar and sugar cane wastes left from making sorgham. Bacteria (which are highly dependent) will play roles only in mushroom growing, in oxidizing dead plant and animal matter, and possibly in fixing nitrogen from the air to replace that taken out by plants.

No animals are in the system, other than Man. There are several reasons for this. First, they are troublesome and require coddling. Second, they are inefficient

sources of human food. An acre used for beef grazing produces about 70 pounds of protein per year. Used for cereal crops, it produces at least ten times that. As a mushroom farm, it produces 70 *thousand* pounds of protein in a year. And thirdly, animals would complicate ecological planning by introducing new cycles by their own nutritional demands. Of course, it's going to take a technological breakthrough to make yeast taste like beefsteak.

On this planet, then, there will be no earthworms to break up the soil, no bees to spread pollens. Man or his contrivances will have to do a lot of the work done on Earth by nature. This artificial system will be in a perpetual state of imbalance, propped up by human intervention. But that's true (to a lesser degree) of agriculture at the present day.

Only after this tawdry ecology has spread over much of the planet will it be possible to make it independent of human control. Man will finally introduce enough plants and animals—thousands upon thousands of different species—to perform all of the functions they do on Earth.

And all of the needs of *these* plants and animals must be met in turn. "Relationships and relationships within relationships." Even if the whole shebang is organized so that there are inputs into and outputs out of each stage of each "commodity," that isn't enough. The mix has got to be quantitatively right. For example, it isn't enough that there be ways for nitrogen to enter and leave the oceans. Just as much nitrogen must enter as leaves. If the two differ for any length of time, conditions will readjust catastrophically.

As anyone who has kept fish knows; it's very hard to design a balanced aquarium, a miniature stable ecological system. It's next to impossible to design a balanced aquarium to prior specifications. To carry out such a

program over a whole planet staggers the imagination. A single miscalculation . . . and seaweed clogs the seas, or grasshoppers eat all the green plants in the world. But sf writers have been blithely assuming just such designs since Gernsback. It's a case of naive linear thinking. Need monsters? Just postulate 'em into existence. Careful writers sometimes postulate a food supply, too—but no one asks what *it* eats, and whether the parts all fit together. It seems to us that the worlds sf creates out of whole cloth are close kin to the emperor's new clothing, and are easier to see through than writers realize.

This discussion of ecology in practice is enough to get the idea across. It's also enough to permit a number of conclusions.

First, any balanced life system is *complicated*. Probably thousands of different species are needed, maybe more. It doesn't have to be as complicated as Earth's; a single species like the passenger pigeon or the redwood or homo sapiens could be spared. But wholesale elimination of most species or of a single class (the insects, for instance) would have an explosive effect.

Second, the life system must be world-wide or, if localized, completely self-contained. It's no good having all the plants living in water and all the animals on land.

Third, Earth's pre-technological ecology was balanced. It's not balanced now. Formerly, changes took place slowly, on geological time scales, like the movement of life from the seas to land, or they were limited and reversible, like forest fires and lemming population booms. Technological man has stepped up the pace enormously so far without even using his greatest unbalancer, all-out nuclear war.

Some people might conclude finally that the only stable ecology compatible with human life is that of pre-technological

Earth. It looks as though western civilization, which is inherently dynamic, is incompatible with any kind of static ecological balance. So, says this school of thought, we must give up progress and western civilization.

The trouble is, we can't. And we don't want to. This seems to leave four alternatives.

We can go on living in an unbalanced system, and hope everything holds together. Maybe it is a very "forgiving" system. On the other hand, maybe in ten years the carbon dioxide cycle will go unstable. The carbon dioxide we put in the air will enhance the greenhouse effect, heating up the surface of the planet, which will drive more carbon dioxide out of solution in the oceans, which will boost the efficiency of the greenhouse effect some more . . . and Earth will get as hot as Venus. Or some other disaster might occur. We don't know.

Or Earth will reach a new ecological balance, in which technology takes part in every process. Earth will be a vast factory, where even the food is manufactured. Man already makes much of the phosphates and nitrates used in fertilizers artificially, and a fair fraction of all the grasses and grazing animals are on farms. In the end, this could lead to a world in which trees, fish, insects, bacteria are farmed; where Man cleans and packages air, water, topsoil, etc., as they are needed. It would be the most extreme form of totalitarianism possible.

Or given unchecked technological growth and space travel, Earth might become the

center of a Trantorian empire. As Asimov wrote in *Foundation and Empire*.

"The entire world was one functional distortion. There was no living object on its surface but man, his pets, and his parasites. No blade of grass or fragment of uncovered soil could be found outside the hundred square miles of the Imperial Palace . . . A fleet of ships greater in number than all the war fleets the Empire had ever supported landed their cargoes on Trantor each day to feed the forty billions of humans . . ."

This seems more a metaphor than a practical ecological design. It would be hard to keep such a system going long. If the spaceships failed to show up for even a few months, everybody would die. Unpleasantly.

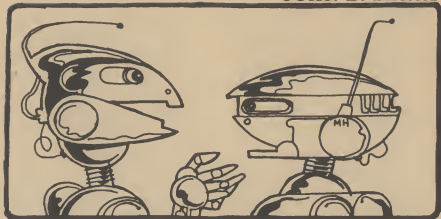
The final alternative is the most grandiose or the most immoral, depending on one's view. Man will use up his planet, then move to others. A vast fleet will carry swarming human locusts to other worlds, which they will somehow remake. (Or they will adapt themselves to suit their new homes.) Man will spread across the galaxy, plundering, destroying and polluting without end.

Insatiably.

—Greg Benford
& David Book

NEXT ISSUE

Bob Shaw, author of "Light of Other Days," "Communication," "Invasion of Privacy," etc., begins his first novel for magazine serialization, *ONE MILLION TOMORROWS!* Don't miss it!



*** THE CLUBHOUSE**

It seems to be time for a few remarks on my criteria for reviewing fanzines. I've done this column in my own way, trying to keep it from becoming a series of quickie contents-listings and pats-on-the-back for every aspiring fanzine editor, as most of the review columns in professional magazines in the past have been. In the process I've alienated some people, although surprisingly few (at least few that I've heard about) when you consider that the column has been running for over a year now. (Seven columns? Why, that's not too many . . .)

I have not tried to be the "objective observer." I don't believe this can be done. We can come more or less close to true objectivity, but in the end a reviewer has to fall back on his own intuition and judgment. If his judgment is worth anything to his audience, then this is not a handicap. My own philosophy of fanzine reviewing (or criticism of anything else, for that matter) was voiced very well by Franklin Ford in an

article in VOID many years ago. Basically, I admit to my prejudices and form a subjective reaction to what I'm reviewing, which I then try to communicate in objective terms to the reader. In the process of objectifying my reactions, I can weed out some of the excesses of personal prejudice, and hopefully in the end you can tell what my subjective biases are well enough to be able to evaluate my judgments.

I've never felt that a reviewer should say nice things about everybody just to be encouraging. Admittedly I don't level the broadsides at my friends that I might at someone I neither know nor care about, but even if I may cushion it in less devastating terms, I'll be honest about what I think is good and bad no matter who produced it. I will not be super-kind to a young neofan [if he publishes a crudzine] just because he's inexperienced, but if he seems to show promise I'll be encouraging. (If he shows no promise at all, I'll be discouraging.) This is entirely based on my own intuition, so don't

accept it as the word from on high, engraved in ten-foot-high letters in a mountainside. Take it all for what it's worth: an attempt at an honest critical column that will be intelligible to readers of AMAZING who aren't fans and at the same time useful to fans who are familiar with the field and probably with the fanzines reviewed.

Tell me if you think it works.

OUTWORLDS #1 & 2, Jan. & Mar., 1970; no price; bimonthly, from Bill & Joan Bowers, P. O. Box 87, Barberton, Ohio 44203; 26 & 34 pp., respectively, mimeographed.

OUTWORLDS is Bill Bowers' first solo fanzine in years. The fanzine he co-edited with Bill Mallardi, DOUBLEBILL, recently folded after its schedule got more and more erratic and the continuity between issues became very slight. Mallardi is supposedly going to publish an individual fanzine too; this is Bowers' effort.

OUTWORLDS is a bit short on continuity within an issue, or at least on traditional magazine structure, but the first two issues have actually come out at a rather short interval, which promises a continuity and frequency that ought to make it a fanzine that will draw response. The contents are pretty much a jumbled collection of diverse items, all of which are submerged in the general tone of the zine, that is set by Bowers' running monolog, which flows about the islets of content and fills the corners of the fanzine. Since Bowers is a reasonably good writer, the total effect is rather pleasing. The decisive element is how discriminating an editor he will be, but while I doubt he'll produce a new WARHOON, the first two issues indicate that OUTWORLDS will be an interesting zine worth reading and writing to when it arrives in the mailbox.

The structure is free-form. Both issues start out with Bowers' own writing, although in #2 it's the beginning of a lettercolumn where he has organized the letters according to topic, with excerpts from the appropriate letters under each topic. He got some fairly good letters. Add to this Bowers' own running commentary, which is much the same whether replying to letters or editorializing for a couple of pages, and you have an entertaining mix. My only real carp is that Bowers sometimes engages in juvenile fan "humor" along the lines of joking about schedules and unfulfilled promises to excess.

I won't try to enumerate the specific content of the fanzine. Bowers shows a weakness for poetry or near-poetic writing evocative of varied moods, as shown by a one-page poem by Norm Rabek in #1 and by his own piece, "You'll Be a Better Universe, For All of This . . .," in #2. He also fancies humor, and Hank Davis's pastiche of 2001: A SPACE ODYSSEY in the first issue is a good thrust in this direction; it's really an amusing bit on what I was afraid would be a far too well-worn subject.

Bowers is very much appearance-oriented, so OUTWORLDS presents a very neat appearance with justified margins and excellent mimeography, and a lot of art. I don't share his predilection for full-page artwork, but in general the choice is reasonable and the layout superb. *Recommended.*

FOCAL POINT vol. 2, #2, Mar. 30 & Apr. 13, 1970; 8/\$1; biweekly, from Arnie Katz, Apt. 3-J, 55 Pineapple St., Brooklyn, NY 11201, and Rich Brown, Apt. D-4, 410-61st St., Brooklyn, NY 11220; 6 & 8 pp., respectively.

Another revived fanzine. In the mid-Sixties, Rich Brown and Mike McInerney

published FOCAL POINT as "a fanzine of news, views, and reviews" that was quite entertaining and balanced the other going newszine of the day RATATOSK—the first with an East Coast slant, the second more West Coast. Both newszines died a lingering death, becoming more and more infrequent until they finally ceased to come out at all, and since then others have risen to take their place. Currently, the dominant newszine is Charlie Brown's LOCUS.

It's precisely in reaction to LOCUS that FOCAL POINT was revived. Arnie and Rich, as well as a number of others, feel that LOCUS lacks something. It fills pages with facts, but sometimes it seems as though there's no news there, or at least no news of the people one wants to know about. I've commented, and heard it said by others as well, that nobody reads or cares about more than one tenth of an issue of LOCUS. Yet still it's the main news source in fandom, unless you have an unlimited phone budget. So Arnie and Rich decided to revive FOCAL POINT and inject some wit and interest and general fannishness into the newszine scene.

The editors certainly have the ability to do it, if they can keep up a biweekly schedule. The old subtitle is still descriptive of what they want: a fanzine of news, views, and reviews, but an interesting one that is enjoyable to read. The first issue is admirable for condensing the boring news, which LOCUS is mostly filled with, to the smallest space possible so that you can skim it quickly. The items are written up with wit and charm, and the whole is nicely illustrated with cartoons by Steve Stiles and Bill Rotsler, two of the very best. I believe the policy is to present one long essay-type piece in each issue; #1 leads off with Ted White's trenchant report of the East Coast Awards Banquet of the Science Fiction Writers of America.

The second issue is similar to the first, but I think it falls into the very trap the editors are trying to avoid: most of the news items, while short, are the sort of book and convention listings and newspaper clippings that fill up LOCUS. They are also not written with the alleviating wit of the first issue. The longer piece is Greg Benford's account of the SFCon, a new regional convention in the San Francisco Bay Area, and he too reports mostly on the official items rather than the really interesting parts of the con (which are usually the parties rather than the program). There's also a one-page "humor" bit by Arnie that never really goes anywhere, and fanzine reviews that are too brief to tell much. The fanzine reviews, though, could be a very useful part of FOCAL POINT if they are given more room.

FOCAL POINT has the potential to be very good, and I certainly won't render a final judgment on the basis of the first two issues. *Recommended.*

SCIENCE FICTION REVIEW #36, April, 1970; 50¢; eight times a year, from Richard E. Geis, P.O. Box 3116, Santa Monica, Calif. 90403; 52 pp., mimeographed.

SFR used to be a very good fanzine. It sparked a fannish renaissance, and even after its emphasis shifted substantially from fandom to science fiction the quality remained high. It was still a fanzine you looked forward to reading. It's not any more.

At just about the time every young neofan and his little brother discovered that SFR was "the" fanzine, the actual quality and vitality of the zine began to disappear. The format became familiar; the much-acclaimed blood and fire of the lettercolumn became repetitious. There were lots of articles by "names," but how many of them did you ever want to read,

unless you were a fan of the particular subculture engendered by SFR's squabbles? I confess to being hard pressed to separate my personal reaction from that of everyone else, but I used to look forward to each issue of SFR with eagerness, and now I seldom read more than a fraction of it. I had to go look to find out what number the last issue was. The old spark is gone.

SFR is just a paper manifestation of the trip that Geis is on, and it happens that he's managed to take a lot of others along with him. Looking down the table of contents of the current issue, #36, I find very little that I want to read. The editorial dialog? Geis's dialogs with his alter-ego get awfully boring after a while, and I'm not particularly interested in his listing four people's Hugo nominations. Poul Anderson's "Beermutterings"? Well, Anderson is usually an interesting writer, but he spends too much of his time expounding political beliefs I don't particularly care about, and this time he devotes a great deal of space to discussing a Chip Delany article in a previous issue that I haven't even read (despite several people's recommendations and my firm intention to read it Real Soon Now). "Who's Afraid of Philip K. Dick?" Although I rather like Dick's writing, another stunning article on someone's analysis of the significance of Philip K. Dick in the history of Western man can wait. Forever. Ten pages of book reviews? Are you kidding? I haven't read any of them, nor do I intend to.

There's more, of course. In fact, looking back over the last few issues, there's usually something of interest in each one, but I have to force myself to ignore the rest and sit down and read it. In #36, Bob Shaw's "Speculations of Fan Mortality" is fascinating to me, because I'm much more interested in fandom than in science fiction, but it seems like a gratuitous flip of the

hand to fannishness, just like the other fan articles that have appeared in the last ten issues and have garnered virtually no response. Much of the rest looks as though it *should* be interesting—but it's not.

The shape of SFR over the last year has been to serve as a discussion center and free-form medium for experimentation and questioning for the science fiction field. Or at least for those members of same who delight in focusing their attentions on SFR. As such the fanzine has gotten some very good material, but in smaller and smaller quantities. #36 presents one of the worst pieces of experimental trash Geis has ever presented—a short, incomprehensible piece by Wiley Nance Jackson with explanations that are longer than the story and even less relevant—which the author in the end admits wasn't worth the ink it was printed with. Admittedly I have a blind spot when it comes to Freudian and Jungian analyses of life and so forth—they mean nothing to me; they don't connect anywhere to reality—but after going through them Jackson admits they are worthless himself. Blech.

SFR is still a repository for some of fandom's better cartooning, although the "cartoon war" between Tim Kirk and Mike Gilbert in this issue seems a bit stale after Jack Gaughan and Vaughn Bode did the same thing in ODD last year with much more wit. Basically, I think SCIENCE FICTION REVIEW is 'way over the hill and no one's admitted it. *No longer recommended.*

Other Fanzines:

The fanzines marked with an asterisk (*) are especially recommended.

*SPECULATION #25, Jan., 1970; 35¢ or 3/\$1; irregular, from Peter R. Weston, 31 Pinewall Ave., Kings Norton, Birmingham 30, ENGLAND; 54 pp., mimeographed. Very good sf discussion and criticism.

*HAVERINGS #43, Jan./Feb., 1970; 6/\$1; bimonthly, from Ethel Lindsay, Courage House, 6 Langley Ave., Surbiton, Surrey, ENGLAND (US Agent: Andrew Porter, Apt. 3-J, 55 Pineapple St., Brooklyn, NY 11201); 8 pp., mimeographed. Ethel's comments on fanzines received; very useful as a guide.

*SCYTHROP #21, Dec., 1969; 75¢; irregular, from John Bangsund, 44 Hilton St., Clifton Hill, Victoria 3068, AUSTRALIA (US Agent: Andrew Porter, address above); 46 pp., mimeographed. Formerly AUSTRALIAN SCIENCE FICTION REVIEW, only now more open and fannish.

BLACK ORACLE #3, Mar., 1970; 25¢ or 3/\$1 (that's what it says); semiannual, from George Stover, P.O. Box 2301, Baltimore, Md. 21203; 32 quarter-sized pages, offset. Oriented toward horror films.

*LOCUS #50, Mar. 19, 1970; 5/\$1, 10/\$2; biweekly, from Charlie Brown, 2078 Anthony Ave., Bronx, NY 10457; 8 pp., mimeographed. Still the leading newszine, for all its faults and competition.

OSFAN vol. 2, #4-5, Feb. and Mar., 1970; 15¢, 6/\$1, 12/\$1.75; monthly, from Douglas O. Clark, 6216 Famous Ave., St. Louis, Mo. 63139 (although it says to send money to Linda Stochl, Rt. #1, Box 89¢, House Springs, Mo. 63151); 16 and 24 pp. respectively, mimeographed. The official organ of the Ozark SF Association.

WINNIE vol. 4, #7-9, Mar. 8-April 5, 1970; 6/\$1; bi- or triweekly, from Michael Ward, Box 45, Mountain View, Calif. 94040; 12, 6 & 6 pp. respectively, mimeographed. Also a worthwhile newszine.

PHANTASMICOM #2, Winter, 1970; 2/\$1; irregular, from Donald G. Keller, 1708 Meadow Court, Baltimore, Md. 21207, and Jeffrey D. Smith, 7205 Barlow Court, Baltimore, Md. 21207; 68 pp., spirit

duplicated.

HECKMECK #24, Jan., 1970; no price listed; irregular, from Manfred Kage, Schaesberg (L), Achter den Winkel 41, NETHERLANDS, with co-editor Mario Kwiat; 38 pp., mimeographed. English edition.

BEABOHEMA #8, Spring, 1970; 60¢ or 4/\$2; irregular, from Frank Lunney, 212 Juniper St., Quakertown, Pa. 18951; 60 pp., mimeographed.

PRISM #1-2, Dec., 1969, and Jan., 1970; 15¢; monthly (?), from Gary S. Mattingly, 7529 Grandview Lane, Overland Park, Kan. 66204, with many co-editors; 28 & 60 half-sized pp. respectively, spirit duplicated.

URANIAN #1, Winter, 1970; no price listed; irregular, from Steve Carper, Todd Union, Rochester, NY 14627, with several co-editors; 13 pp., mimeographed.

MOEBIUS TRIP #3, Jan., 1970; 35¢, 3/\$1, or 6/\$2; 10-weekly, from Edward C. Connor, 1805 N. Gale, Peoria, Ill. 61604; 32 pp., mimeographed.

*THE SCARR #201, Jan., 1970; no price listed; irregular, from George L. Charters, 3 Lancaster Ave., Bangor, NORTHERN IRELAND; 16 pp., mimeographed. Funny and idiosyncratic.

SF COMMENTARY #8, Dec., 1969; 9/\$3 Australian; irregular, from Bruce R. Gillespie, P.O. Box 245, Ararat, Victoria 3377, AUSTRALIA; 46 pp., mimeographed.

THE INDELLABLE (sic) SPOT #1, Mar., 1970; no price listed; irregular; from James Langdell, 1756 14th Ave., San Francisco, Calif. 94122; 8 pp., spirit duplicated.

ONYX #1-2, no dates; \$2 or \$3 mailed in a tube; no schedule, from Ronald Williams, 406 E. 83rd St., #2B, New York, NY 10028; one large sheet each. This isn't a fanzine, it's some kind of periodical psychedelic poster. They call it a "broadsheet."

ENERGUMEN #1, Feb., 1970; 40¢;

quarterly, from Mike Glicksohn, 35 Willard St., Ottawa 1, Ont., CANADA; 32 pp., mimeographed.

—John D. Berry

Fanzines for review should be sent directly to John D. Berry, 35 Dusenberry Rd., Bronxville, N.Y., 10708

EDITORIAL

(CONTINUED FROM PAGE 5)

(And, no, we have no plans at present for going monthly.) In terms of the waiting period between installments, we compete directly with those monthly magazines which publish three-part serials—the period in each case between first and last installments is two months. (Of course a couple of our competitors have been breaking up relatively short novels into as many as five parts, publishing installments of as few as twelve pages at a time. That strikes me as simple opportunism—the reader is “strung along” and forced to keep buying the magazine. The same is true of “overlapping” serials in which the final installment of one novel appears in the same issue with the opening installment of the next. We serialize in order to publish important new novels, not to coerce you into buying our next issue. I’d like to think that isn’t necessary.)

Then there’s my own subjective feeling about the function of a novel in a magazine. I feel that one of the purposes of a magazine is to present material of a variety of lengths and styles and needs. Most modern sf readers, I think, want at least one ‘major’ item into which they can sink their teeth. They want at least a piece of sufficient length for the author to stretch out and probe his protagonists, and one in which they, as readers, can ‘live’ for a while. Although a novel will suit this function well enough even if sliced into thinner installments, the opportunity to read from 25,000 to 40,000 words at a time is, I think, more satisfying. It is, at least, for me. Novels

are paced and built in such a fashion that one can often ‘feel’ the various stages of their development, and there is something intrinsically satisfying in reading a novel to its half-way point in a single installment, knowing that one will, next issue, follow it all the way home. Thinner slices fail in this respect; I’d guess that reading less than a third of a novel in a single installment is far less emotionally satisfying. It would be like being served a juicy thick sirloin steak in small pieces, spaced an hour apart. One ends up having eaten the whole steak, but without the feeling that he has ever really had more than a tantalizing snack.

Returning to the point at which I began this editorial, another element of the ongoing adventure of this magazine is one you’ve already noticed on the cover: our new logo. Its ties with the past are evolutionary, but in design it is more modern, and hopefully more attractive and visually appealing to you, our readers. In the months to come we will be carrying out further innovations, all of which strike me with a sense of adventure and excitement. Not the least of these are several projects upon which Mike Hinge is working, and for which I have high hopes. Without sloganeering about “Alternatives,” or “Pertinence,” we expect to continue AMAZING’s new vigor into and through another decade—and we are now in our fifth of continuous publication. Stick with us. You won’t be sorry.

—Ted White

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FUTURE in BOOKS

Joanna Russ: *AND CHAOS DIED*. Ace Books 02268, New York. 1970, 189 pp., paper, 75c.

Reading this, I began to feel that it just might be the best sf novel ever written. The experience was a bit like watching a cool lady in black, standing at a dice table one dim gray Las Vegas morning some years ago, making bet after bet, never refusing the dice when they came to her—and winning, incredibly, every play. The lady eventually picked up her winnings in a white-glove and left, carrying most of the eyes in the room with her, but for Miss Russ it is not that easy. I put down her book feeling that she had entered a game without inquiring into the rules of the table.

This novel is about Jai Vedh, a castaway on an uncharted and unbelievably Earthlike planet. He is part Hindi and has blue eyes and that is about all we ever learn about him. He is a cypher with tags pasted on—civilian, artist, homosexual—dropped into a band of telepaths who bring out his

own latent telepathic abilities. This experience is the core of the novel; the process Miss Russ puts her readers through adds a complete new dimension to sf ideas about psi.

And Chaos Died isn't a book about people—there aren't any people in it—but about the interface between cultures. Neither you nor I nor Miss Russ knows anything about the experience of total telepathy. In sf it is just one more cliché, often used to avoid plotting problems. But the telepathy in this book is a completely altered perception of reality. Jai Vedh perceives mass (as a twist-in-space), sees auras, passes through solid objects and moves in a world totally unlike anything you have (probably) ever felt. It is a trip well worth taking. On this leg alone it stands as the best "acid novel" ever written. It is just our good luck that *And Chaos Died* is a sf novel as well, for science fiction is a better focus for the energy this concept demands.

Miss Russ keeps asking, all through the book, how a human being with completely altered consciousness—not shattered in the stereotyped Aldiss mode, but fundamentally changed—can live in a normal world. It's the same problem our drug culture has. Her answer seems to be essentially the counsel of despair—there is a clear sign at the end that the telepaths survive by destroying Earth and man's normal society. Thus heightened consciousness leads its bearers down the same dark path man has traveled before. There is a lot of Poul Anderson in this finish.

The divergence between Jai Vedh's world and ours is realized in lean, funny, stunning prose—some of the best ever written in this genre. To paraphrase Delany speaking of Disch and Zelazny—what is she doing here?

A woman with this much magic in her pen is usually seen accepting National Book Awards, not Nebulas and Hugos. Wherever she came from, she is a blessing and in one fell swoop, in one book, has shown the entire field what all those thoughty psi pieces (by writers not fit to sharpen Miss Russ's pencil) *could* have been.

It is sad, then, to see this marvelous spirit succumb to an escalation of philosophical level the book just can't support. Mystical novels often promote tension and drama by raising the ante every round; before the reader has time to read his cards, you chuck him up to the next level. Miss Russ uses this sleight of hand in place of an organic climax, but by this time her novel has already run away with her in several other directions anyway. It is very hard, for instance, to believe Jai Vedh is in serious trouble when he can teleport from captivity in a star ship, roam at will through a regimented Earth, heal himself, kill anybody, read minds, and generally cut up any way he likes. The book is curiously similar to Heinlein's *Stranger In a Strange Land* this way—the hero acquires one talent

after another until there are no more visible problems left in the story. There are no limits.

On top of this comes the nearly opaque climax, written by a drunken Buddah, in which Jai Vedh seems to witness the demise of Earth and the reader suffers a severe attack of motion sickness. It is a clear breach of contract between author and reader. Had Miss Russ not tried for an overkill of enlightenment, she could have had a better book.

Novels this ambitious always fail. But it is seldom that you see an artist writing over the heads of 90% of the writers in this field (including me), and it is a welcome sight. This is a great book.

Read it.

—Greg Benford

Robert Dille, Editor: *THE COLLECTED WORKS OF BUCK ROGERS IN THE 25TH CENTURY*; with an introduction by Ray Bradbury. Chelsea House, New York, 1969. 375 pages. \$12.50.

The Collected Works of Buck Rogers in the 25th Century is a large, splendidly bound, handsomely packaged insult. It was heralded by a series of condescending advertisements in the late November and early December *Times Book Review* obviously aimed at monied souls with Christmas gift problems—what to give that odd cousin Rupert, the one who likes science fiction! and comic strips!—and such tittery folk as haven't yet heard that camp was *last year's* craze.

The book itself is no better than the ads. Worse, maybe.

I am not prepared to argue, with most of my colleagues, that comics have been, or even can be, a major art form. I don't know. But they are unquestionably *some* sort of art, and beyond aesthetic considerations, they are unique as the closest thing possible

to instant mythology. They are produced closer to contemporary history than any other entertainment except popular music, and they almost always articulate the attitudes of their main audience, the lower- and middle-middle classes. And although, until recently, comic strip artists and writers have been relatively unsophisticated, many of them possessed huge raw talent and energy.

So, one might spend the price of 16 good paperbacks on a collection of comic strips for any of three reasons: to enjoy good folk art, to study reflections of social preoccupations, or to wallow in nostalgia. These *Collected Works* serve only the last purpose, and that poorly.

Buck was, on and off, a pretty good comic strip, but never one of the greats. *Flash Gordon* was generally more literate, and infinitely better rendered; *Krazy Kat* was more surrealistic and charming; and Will Eisner's *The Spirit* was all of the above. *Buck* was vigorous, and he probably served as a liason between the funny page and science fiction magazines, but there is no reason to preserve his adventures as fine examples of their medium. Many aficionados feel that *Buck's* best years were the late 40's, when Murphy Anderson's uncluttered, beautifully balanced drawings illustrated the daily strips and stories were bought from various freelance sf writers including, according to rumor, Fritz Lieber, Theodore Sturgeon and Judith Merrill. Murphy told me that his personal favorites are the Sunday pages done in the mid-30's by Russel Keaton. Neither the Anderson nor the Keaton versions of *Buck* are included in Robert Dille's collection.

Instead, Dille has assembled a very mixed assortment of work by *Buck's* originators, Dick Calkins and Phil Nowlan, and Calkin's assistant, Rick Yager. Some of it, like the origin series, is amusing period stuff; some,

like the World War Two anti-Japanese propaganda, is appalling. None of it shows the touch of an able editor: episodes begin at random and end arbitrarily, often at a crucial point. If, for some esoteric publishing reason, it was impossible to reproduce whole sequences, Dille could have certainly appended transitions and brief summaries of excised portions. A few short paragraphs would have done the job neatly. Dille has also included a *Buck Rogers* radio script, some promotion material, pin-ups and photos of *Buck Rogers* toys, all without a word of explanation. The book wasn't edited; it was hurled together.

Dille may have undertaken the hurling chore to solve his own Christmas gift problems—the royalties from the 25,000-copy sale would buy a lot of neckties—or to memorialize his father, the late John Flint Dille, owner of the syndicate which peddled the strips. Whatever his motives, his product is so sloppy that it is obvious he neither knows nor cares about *Buck*, comics, science fiction or popular culture.

The introduction, misleadingly titled "Buck Rogers in Apollo Year 1," is Ray Bradbury's breathless-urchin-in-Illinois routine, again. Anyone able to get through *Something Wicked This Way Comes* without conceiving a maniacal hatred for small boys and midwestern folksiness may enjoy it. It is the best thing in the book, and that is damning it with the faintest of praise.

The Collected Works of Buck Rogers in the 25th Century is a grand ornament for the end table or that space on your bookshelf reserved for . . . well, Christmas' gifts. You'll like it a lot, if only you resist the temptation to look inside.

—Dennis O'Neil

Vernor Vinge: *GRIMM'S WORLD*, Berkley, New York, 1969. 178 pages, paper, 60¢.

In this first novel Vernor Vinge has already come close to beating Jack Vance at his own game: the creation of solid, sparkling background; background so gritty with the feel of reality that, in a lesser book, it would carry the whole novel. Vinge has constructed a world far from Earth on which men have no history beyond 3000 years back; they don't know where they came from. A publishing barge sails about the planet, publishing FANTASIE, a regular magazine (including large dollops of sf) that constitutes this world's major medium of communication.

Svir, a young intellectual, gets involved in a plot to save the 700-year-old FANTASIE collection, which is in danger of being destroyed by its new owner. The idea of a floating magazine publishing house which maintains the magazine's continuity because the barge isn't wedded to any particular government, is intriguing—but that's only the beginning. Svir finds he is involved in multiple subplots and overplots he can't understand, most of them revolving about Tatja Grimm, FANTASIE's publisher and a woman of incredible intelligence. Grimm seizes control of most of the planet, encounters men from offplanet, and discovers what the history of this world has been all about.

This is exciting and interesting, but the best parts of the book require work. Vinge is concerned with what he regards as the primary fact of our future—that human intelligence will increase greatly when we get genetic manipulation down pat. Svir and the rest are ordinary, dumb men—like us—but the offworlders are normal men of some future Terran empire and therefore quick, smart and inventive. Svir doesn't understand very much, but he is observant and picks up enough for us to guess what's going on. Portraying superintelligences is impossible, I suppose, and Vinge's try lacks

conviction in spots. Certainly his methods—unexplained detail, clipped conversations between the geniuses—aren't new, but together they work decently enough. There is a nice bit of business about star charts that rewards study: after peering at the mysterious numbers for a while, I eventually realized that the unusual bursts of light they recorded could only describe a faster-than-light ship approaching the planet. That isn't mentioned in the book at all; the reader can either work it out, or just accept the conclusion which is tossed off obliquely some distance further along.

Grimm's planet is poor in metals, so Vinge has worked out an original technology of about 17th century level using some solid science and impressive ingenuity. He describes how people on such a world would build a 60-inch (!) telescope on the planet's highest mountain, where men die of oxygen starvation; how armies are maneuvered with rudimentary communications; how to publish a magazine without metal type or fixtures. It is all marvelously well done.

Sword-waving and a certain nostalgia for medieval trappings have inspired a lot of semi-sf novels. Vinge takes this basic predisposition and does something concrete with it. His world has real topography—the Doomsday capital by the glaciers at Overmouth, frozen and somber; alien forests on the Picchiu River, just strange enough to never quite blend into the background—and customs that aren't a rehash of Arthurian manners. There are no discontinuities, like people dueling with swords and riding around in cars. Even the prose is a bit languid, to give a feel of the past.

One defect of the book is the feeling of detachment from events that comes of dealing with only the people at the absolute top of society. Battles take place in the

distance and—by necessity of the plot—there is much intellection about events. Still, this may be an inevitable result of making most of the ordinary men in the story seem to be manipulated.

This is Vinge's first novel. If he can continue to be so original and thorough, he could become one of our best storytellers.

—Greg Benford

James Blish: *SPOCK MUST DIE*. Bantam Books, New York, 1970. 118 (!) pages, paper, 60¢.

When people complain about James Agee's film criticism, which isn't often, they generally remark that Agee was often guilty of lamenting the movie that wasn't made, instead of dissecting the one that was. I'm afraid I'm going to be guilty of Ageeism here, because *Spock Must Die* could have been memorable science fiction, and settles for being an hour's worth of extremely forgettable mind-cud.

Writers who undertake "novelizations" of fiction originally intended for other media have a convenient excuse (or cop-out) for their books' shortcomings—the limitations of the original story. James Blish emphatically refuses to make such a plea. In an author's note, he says: "Unlike the preceding three *STAR TREK* books, this one is not a series of adaptations of scripts which have already been shown on television, but an original novel built around the characters and background of the TV series conceived by Gene Roddenberry."

A lot could have been done with a novel so built. Anyone who has watched this tube version of s-f in any state short of advanced cathode-ray sonambulism has Questions. Why is Jim Kirk, he of the quick fist and sluggish intellect, the Commander? Why is Spock, Kirk's superior in all save rank, his lackey? Does Star Fleet Command ever do

anything other than receive reports and refuse advice? Are all starships as undisciplined as the *Enterprise*? What rule requires captains to always send their five most indispensable crewmen into extreme danger at every possible opportunity? Has Twenty-Second Century Karate so degenerated that it resembles Liberace swatting spider webs? And what future equivalent of saltpeter do they feed the male Enterprisers?—gentlemen who view the stunning Lieutenant Uhara as part of the console.

We know that us Audiences are supposed to accept, judging not, lest we find better ways to waste time. It is a given that any tv character has a viscera full of novocaine and the mentality of a bright chimpanzee. Still, there are interesting facets of the Star Trek gestalt, most of them accidental byproducts of television exigency, and I wish Mr. Blish had chosen to explore them. Maybe he wishes that, too: he *did* begin the book with a powerful premise. Says Dr. McCoy: ". . . whatever the mechanism, the *effect* of the transporter is to dissolve my body and reassemble it somewhere else . . . at the other end a body is assembled which apparently identical with the original . . . *But it is NOT the original*. . . I am a construct made by a machine after the image of a dead man—and the hell of it is, not even I can know how exact the imitation is because . . . if anything is missing I wouldn't remember it." (Italics his.)

Having made that intriguing beginning, Blish virtually ignores the problem and spins out the yarn of a duplicate Spock, created by unexpected interference with the transporter. The second Spock, we are expected to believe, is a mirror-image of the original: where the Science Officer we know and love is Noble and Good, his doppelganger is Wicked and Vile—and

what's worse, unpatriotic. He is *not*, however, stupid or illogical, traits opposite those of his template. So he is, above all else, Inconsistent.

Blish could have accomplished something fine. He could have given future viewings of *Star Trek* reruns the eerie aesthetic resonance that tingles the mind when you read Shakespeare's source material after reading Shakespeare, or hear Ian and Sylvia's version of 'Someday Soon' after listening to Judy Collins'. Twelve years ago Blish

published *A Case of Conscience* (now available in a Walker hardcover reprint) and the man who wrote that concerned and passionate novel must have the talent needed to reshape and intensify Kirk and Co. For whatever regrettable reason, he didn't.

Be advised, therefore, to take your Trekking straight from the tube, if take it you must: in the broadcast version, at least, one can ogle that splendid Uhara lady.

—Dennis O'Neil

(CONTINUED FROM PAGE 27)

thoughts for the aliens to study. That way, if any human somehow happened to blunder on the scheme in one way or another—mental blundering, as well as physical would have to be considered, what with clairvoyance and the emanation into space of thought waves, and the like—then the extraterrestrials would immediately know about it. And what they would do would be to train the full strength of this completed portion of the machine on that particular human, and with it eradicate all those thoughts endangering their project, thus insuring its safety.

Kensington was sweating a bit now, his forehead crinkled in deep thought.

Sure, he thought, it's a touch far out. But if I handle it right, who knows? At least it's a good, workable idea, which is a hell of a lot better than nothing at all. Now, how am I going to save Earth from this fate? It has to be in some way that is totally plausible, not too gimmicky, and . . .

All at once the answer popped into his mind. *By God!* Kensington thought. *It's perfect! There's not a flaw in it!* He grinned hugely. *Those damned aliens wouldn't stand a snowball's chance in you-know-where if I set it up this way.*

He stood abruptly and started for his typewriter. The progression of the story was already flowing, plotting itself firmly in Kensington's mind.

He sat at the typewriter, excitement coursing through him because he knew, he could feel, that the dry spell was at an end. His fingers poised over the keys.

Quite suddenly, quite inexplicably, his mind went blank.

He pressed his forehead against the cool surface of his typewriter.

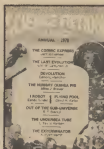
Why, he moaned silently, why, oh, why can't I come up with just one little story idea?

—Bill Pronzini

NEXT MONTH

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...Or So You Say

Letters intended for publication should be addressed to Or So You Say, c/o P.O. Box 73, Brooklyn, N.Y., 11232

Dear Ted,

Your account of *Black Easter* in the January AMAZING (which I have only just managed to find over here) contains so many errors of fact and implication that I must ask you to publish these corrections:

"James Blish is not a prolific author, and he has not written many novels." At the time your review appeared, I had 27 books in print (not counting one I only edited) and of these, 19 are novels—plus another novel which appeared in AMAZING itself which hadn't then achieved book publication (now due in July). Since 1940 to the same date, I had published more than 250 titles, including short stories, articles, literary criticism, poetry, TV scripts and a play; and about two thirds of this work is listed in the Day and MIT Indices. I am one of the few writers in our field who lives entirely upon writing, so it is financially important to me that my record not be falsified.

In discussing my fan magazine article about the trilogy of which *Black Easter* is a

part, you say "But all this talk . . . has successfully obscured all direct criticism of *Black Easter* as a novel in its own right, at least till now." My file of reviews, which I think contains nearly all of them from four countries, shows this statement to be untrue; and its presupposition, that all these reviewers read WARHOON, seems rather unlikely. The book itself is labeled part of a trilogy, but contains no further discussion of the matter. You further say you "suspect" that the notion of the trilogy was an afterthought; but I had already said that this was the case, and discussed it at some length, in the same fan magazine article you cite.

The demon who appears at the end of the novel is not Satan, but the subsidiary triumvir Put Satanachia, and is so named. I saved Satan for the sequel.

Baines was not named after Johnson, and in any event the novel was written in 1965, when Johnson's reputation as a "warmonger" was in its infancy; he had run against Goldwater on the opposite platform only the preceding November. His business is modelled upon that of several men I once knew personally, with such alterations as

were necessary to protect me from libel suits; the black market in weapons in Vietnam is quite irrelevant to it. His motivation is plainly shown in several places and should be easy to understand: He is "ardent about his trade" (p. 45) and cares for nothing else, a common syndrome among American company presidents and in top management generally.

Ware's researches are not simple murders. His prosecution of them did not fall within the scope of the events covered by the novel, but they are nevertheless discussed in two places (pp. 76-77 and 115). He never says he has no use for money; on the contrary, though he says he is wealthy (p. 29), he also says his research is expensive on an almost governmental scale (p. 76). This is why he wants Baines' money; the point is not avoided, but carefully explained.

You appear to think that a demiurge is a kind of demon. It is not. The spirits with whom the White Monks chiefly traffick are the Celestial Princes or Stewards of Heaven, four of whom actually appear on page 125.

You say "he portrays all his characters as emotional ascetics . . ." Jack Ginsberg, a major character, is afflicted with satyriasis, which is about as far from asceticism as it is possible to go, and nine pages (95-103) are devoted to establishing this.

"... the long penultimate scene in which Ware summons up forty-eight demons, by name, is of surpassing boredom for any reader . . ." (my emphasis). Eighteen demons are shown being summoned, and nine more are named inside a single paragraph. The other 21 are present only by implication. The alleged universal boredom goes unmentioned in better than 90% of the reviews, and did not prevent 11 inquiries from film producers, two of which ripened into offers.

You say I never explain why Fr.

Domenico's room stank of demons, or how it relates to the story. The explanation begins in the paragraph immediately after the two you quote, and culminates, as obviously as a blow on the head, with the announcement of Baines' arrival. That demons take a peculiar interest in Baines is further spelled out on page 40.

The book you describe might possibly be said to be "dishonest to its readers." It is not the book I wrote, which, by the way, ran third in the 1969 Nebula voting, has seen British, French and Dutch editions, and is about to be re-issued over here by Penguin Books.

James Blish
Treetops
Woodlands Road
Harpsden, (Henley)
Oxon, U.K.

Jim, you have admirably picked apart a dozen nits in my review. But you have not dealt with one of its major points. Nonetheless, I welcome your letter and publish it willingly; I am much more interested in presenting a dialogue on points of dispute than in giving the impression of editorial (or critical) infallibility. You state you are prolific and cite nineteen novels, as the work of some thirty years of writing. "Prolific" would seem to be a state of mind rather than any specific set of standards for volume, but as the author of thirteen novels in the last six years—and I do not regard myself, at an average of two books a year, as prolific—I obviously do not subscribe to your definition. In any case, I discount your Star Trek books as trivia and consider Black Easter your most recent novel deserving of critical consideration. Lacking your file of reviews (as well as an orderly file of WARHOON's), I must rely upon my memory. It suggests to me that too many of the reviews I read stressed Black Easter's role in the trilogy, and that not one dealt

with the flaws I discussed. However several critics in the field have made a point of agreeing with my review in private conversation.

I will cheerfully admit that my "suspicion" about the trilogy being an afterthought must have been drawn from your own statement in *WARHOON*, although I no longer recall it—I know I read it at the time. You must also forgive me for not bringing to your novel Latin scholarship sufficient to detect the difference between Put Satanachia and Satan. For a layman with little interest in the minutiae of Roman Catholic superstitions, the context (which I have just reread) offers no clue beyond the name, in which "Satan" is embodied. I have no idea who you knew in the munitions business, but I am sure your version in Baines libelled no one. Few human beings (in all their human conceit) would recognize themselves in your portrait of a man who "was ardent about his trade, which was destruction." You do not describe a man interested in destruction—such men are men of passion and involve themselves in the results, not the means, nor at such abstract length.

You cite the pages on which Ware describes his search for Knowledge, and claims that it is an awful expense (which he hopes Baines will underwrite). But if Ware is truly interested in knowledge about the Persons who move the universe, he has taken a remarkably inept means for pursuing it—the use of magicks for petty purposes. And surely wealth is meaningless to him: in its conventional uses he can do better without it. Indeed, he states, (p. 76) that he can live for hundreds of years if he chooses. If he needs money, it should not be difficult to find an easier access to it than committing murders for pay. Your careful explanation is nonsense, as well you know. It is double-talk by which you evade one of

the fundamental dishonesties of the book.

On pp. 124 and 125 you show no connection between the "Celestial Princes" and "demiurges," and if I deduced the latter to be "demons" from the context, that might possibly be another failing of the book. Reference to Websters, however, does not clarify the point. After first defining "demiurge" as "one who works for the people, skilled workman," etc., and skipping over Plato's philosophy and Greek history, we come to Gnostic philosophy: "a god subordinate to the supreme god, sometimes considered the originator of evil." That implies in my mind Lucifer, the fallen god, and, by implication, the supposed minions of hell, popularly called "demons." So much for that nit.

That "long penultimate scene" in which the demons are summoned up runs twelve pages. I hope I may be forgiven for not counting to see if indeed you did name all forty-eight. It felt like forty-eight. I've queried everyone of my acquaintance who has read the book; all said they skipped over the section or skimmed it. The number of film efforts you've received is not, I trust, pivotal to that chapter; it strikes me as an irrelevant justification.

The question of the room that stank of demons still seems to me unsettled. Why, if the demons were so concerned with a man who had not yet arrived, would they anticipate his arrival by stinking up a room in a place where he has not yet been? The writing, Jim, is murky in that first chapter. Allusions abound to facts accessible to the protagonists but not to the reader. The effect is to portend doom of some sort, but try as I may, I see no logical reason, within the context of the story as you wrote it, for demons to go about stinking up the rooms of a white monastery in anticipation of the arrival of a man over whom they are obviously keeping close surveillance.

You have not commented on my principle charges of dishonesty: the fact that the book is a padded short story, that the characters are cardboard (Jack Ginsberg's satyriasis is laughable to anyone with an acquaintance with the subject), and that the ending is totally irrelevant to the story. Instead, you've cited the signs of the book's popularity with less than two dozen sf writers and several publishers in various parts of the world. I'm happy for your financial success with it; I'm saddened by the fact that as James Blish you seek to equate this success with its artistic success when as "William Atheling, Jr." you know far better.

—TW

Dear Mr. White,

First, a word of congratulation. I have just finished reading the final installment of "By Furies Possessed" and loved every word of it; it is head and shoulders above any of your longer works that I have heretofore perused. By a strange coincidence I read the first part and the accompanying editorial directly after having caught the Star Trek episode that inspired it on UHF. You were perfectly right; that show demonstrated all the weaknesses, the sophmoric morality, the arrogant and often cruel nature of Kirk, the ridiculous caricatures, that killed the show. But it seems strange that such a bit of trivia should inspire such a fine novel as yours. It is one of the first that I have read that seeks to analyze the particular neuroses and frustrations that will accompany an overcrowded world. Your characters were real and your description of the details of your future world superbly presented. I hope you can maintain this high standard of achievement in any future novels you might write.

I think that, as far as your editorial policy is concerned, you have made a wise choice

in staying moderate in the current new wave/old wave brawl. Holy wars, book-burning, and mindless vituperation has characterized many of the combatants on either side and there is really no place for either extreme position in literature. The ultimate test of worth will not be for a movement or the critics who can muster more name-callers. What will be remembered are those stories or novels in either mode of speculation that will clearly demonstrate their worth to a discriminating reader. A good piece of literature is just that and no more whether the author describes it as "new wave" or "old wave" and any intelligent reader should accept it or reject it only on its merits.

I am glad to see that your covers are improving and the unfortunate number of typos are diminishing. They were two factors that were serious blemishes on your record as an editor. Your final frontier has got to be your miniscule type size; it is almost impossible for a pair of tired eyes to read. I often am forced to put aside a new issue of your magazine for weeks until I can find time to read it without developing a monster headache. I know that if the size is increased there will be a resultant diminuation of reading material but I think that many of your readers would sacrifice the reprint (which I gather is there principally for economic reasons). This is especially true when one considers that your publisher has and is releasing a flood of magazines culled from the same sources as your reprint; those who want the reprints can easily obtain them in this form.

Finally, your editorial on the economics of the sf magazines was vital. The only real method of subverting the vagaries of the distributors is thru subscriptions and I guess they are fairly hard to build up. I hope that the sf magazines do not perish for I seem to derive much of my reading pleasure from

them but art always seems to give way to money these days and nothing can really be done by the tiny minority that buys magazines regularly.

Yale F. Edeiken
2635 Cranston Rd.

Philadelphia, Penna. 19131

We are considering a larger type-size—it is possible we'll use it in our next issue. There are various economic factors both for and against. I should hate to have to cut back on the features, which I regard as an essential part of this magazine, but a larger type size would hit them first, I fear. It is indeed possible that there is nothing any of us can do to improve the marketing situation of the sf magazines, but I'm not convinced. Read my editorial in the October FANTASTIC for several specific suggestions.

—TW

Mr. White:

If you would take the time to send a young, aspiring (and of course brilliant) science fiction writer your manuscript form requirements (and, if you would, the rates of payment), a would-be Isaac Asimov would be most appreciative.

Thanks very much for your kind attention.

Stephen M. Towey
(no address on letter)

I receive requests like this an average of several each week. There is more than one good reason why I don't answer them, and I hope that this answer may suffice for you all. To begin with, the form in which we want our manuscripts is the standard manuscript form, as taught by all schools, writers' magazines, etc. Double-spaced typing on one side of each sheet of paper. If you have not yet progressed to this stage of professionalism, I very much doubt I'd want to see your story anyway. The rates we pay

vary by length, author, and quality of story. For an unknown writer of a story of average quality, rates begin at 1¢ a word. We are quite understaffed, and I haven't the time to reply to each and every request for such basic information. Nor do I have the time to read all the stories which are submitted by writers totally unknown to me. This may seem unnecessarily cruel and harsh of me, but I am not in the business of teaching people how to write—and the submission of dog-eared four-page stories with plaintive notes to the effect of "I know this story isn't much good, Mr. White, but I wonder if you could tell me what's wrong with it/what you think of it" is simply an imposition upon my time. Take the time to learn your craft. If nothing else, make use of your library or the newsstand for the books and magazines devoted to learning to write. Learn to type (dozens of stories are submitted each month in illegible hand-scrawled ball-point or worse). For you there is only one story involved; for me there are many. I might add that if you think you have a good story to submit, do so. Don't write to ask if I'd like to see it, or give me a capsule synopsis. These are time-wasters and nothing more. And, if you do expect a reply, include your return address on your letter; letters are often separated from their envelopes here in our gigantic offices.

—TW

Dear Mr. White,

I don't know if AMAZING is the "World's Leading Science Fiction Magazine" as the label on the front states, but it is heading that way. (Incidentally, be wary of self-imposed labels. What kind of an honor is it to call yourself the leading sf magazine? Reminds me of something in MAD—I think—with cover quotes like "The best science fiction novel of the century!" attributed to their correct

source—the writer's wife.) At any rate, the May AMAZING is consistently good.

Concerning people who complain about type-setting errors: I never complain about them, or get upset about them, anymore. Not since working as the assistant editor of our school paper taught me that no matter *how* careful you are, and how many people you get to copyread, some errors will slip past. And even if, by some miracle, *all* errors are caught—even on the final page proofs—the printer will goof or the machine malfunction, and bingo! a line is set upsidedown or omitted, or words are misspelled. It's fate; you can't fight it. Set a perfect magazine—no errors whatsoever—and the world would come to an end.

Bill Warren's story was extremely effective, but was marred for me by a nagging error. While I read it I kept thinking that it was not *Saturday's* child that has far to go—it is *Thursday's* child! Maybe Mr. Warren learned a different version of that verse, but the one that I have always known goes:

Monday's child is fair of face,
Tuesday's child is full of grace,
Wednesday's child is full of woe,
Thursday's child has far to go.
Friday's child is loving and giving,
Saturday's child works hard for a living.

But the child that is born on the Sabbath Day is bonny and blithe and good and gay. Oops! Just had a flash of memory and looked up William Tenn's story "Wednesday's Child". It seems there are two versions of that poem—mine and the one Bill Warren apparently knows. Oh, well.

Lisa Tuttle

6 Pine Forest Circle

Houston, Texas 77027

You'll note we've dropped the offending line from our cover.

—TW

Dear Mr. White,

In regard to a paper I am writing, hopefully to be published if it turns out any good, I would appreciate if your readers could write me giving their favorite works of science fiction. While I do read a great deal of science fiction myself and subscribe to the six leading science fiction magazines, any selections of my own are liable to be prejudiced if through nothing more than omission. In my paper, which I intend to be a readers guide to science fiction, I am attempting to do many things such as giving synopsis on the most memorable science fiction to date, and complete bibliographies on the leading writers in the field. Included as an appendix will be a complete list of award winning science fiction (Hugo and Nebula as well as individual editorial awards to be included).

In general, I am looking for reader response in regard to the following;

1. Greatest Authors of all time.
2. Greatest Books and Short Stories.
3. Most Representative works in different science fields (time travel, spaceships, war, BEM's, phisics, future histories, etc.)

I am having a great deal of difficulty in compiling bibliographies and award lists, and if any readers, or an individual author could help with this, I will make mention of it.

I also intend to send inquiries to leading authors and fans in the field, but if I should neglect anyone, I hope they will respond to this.

I do intend to mention by name leading authors and editors who respond, but all such responses will be carefully compiled and the results of the survey will be included in the paper.

Kenneth R. Konkol

Rt. 1, Box A74M

Kansasville, Wisc. 53139

Dear Mr. White:

"The Balance" was a well written story and I enjoyed it, although it would have been better if a solution to the problem could have been found, rather than the moral that we shouldn't meddle into things that we don't understand. The ending was a cop-out anyhow, as it left the problem unresolved. (Humans have taught the natives about weapons, and those that would have used the knives will now improvise some, whether there is an embargo or not.)

"Blood of Tyrants" and "A Skip in Time" were both very good. More Ben Bova, please.

"Nobody Lives on Burton Street" was difficult for me to understand and because of that, I didn't care for it.

"Saturday's Child" was the best story in the entire magazine. Also more of Bill Warren. (Is that a pen name? It doesn't ring a bell. On the other hand, maybe I've seen the name and promptly forgotten it because it's such a common one. If that's the case, perhaps Mr. Warren should acquire a nom de plume.)

At first I wasn't going to comment on "By Furies Possessed", because I missed part I, and it's hard to say anything about one half of a story. However, here goes: Your conclusion should have been longer so that we could have more insight on what it's like to have an *arapad*. I hope that you're expanding your story into a full novel and will take care of my criticism in it. Another question just popped into my mind—is it ethical for an editor to submit a story to his own publication?

Michael J. Stern
883-D No. Vineyard
Ontario, Ca. 91762

Not every problem has a solution; in "The Balance," the story-resolution was not the solution of a problem, but the dawning

realization of the problem by the protagonist. Bill Warren has scripted stories for CREEPY, EERIE, and perhaps other magazines of a similar nature. As for my own novel, it is of course sometimes difficult to know how much weight or emphasis to give to various elements, and I thought the effects of the arapad had been explicitly enough stated. Since the total novel runs 75,000 words, I have no plans for further expansion. In reply to your last question, I can only say that you've raised a ticklish point, and one which has never been adequately resolved. I have followed tradition, however: the editors before me who have purchased their own stories include John W. Campbell, Jr., Ray Palmer, Fred Pohl and Donald Wollheim. On the other hand, when Avram Davidson assumed the editorship of F&SF, he rejected one of his previously accepted stories. —TW

Dear Mr. White,

I have just finished reading your excellent editorial in the May 1970 issue of AMAZING STORIES. This editorial has prompted me to write to you because what you say about sf professional magazines applies—in a smaller scale—to what is happening here in Argentina. The history of sf prozines in this country is quite simple and short. The first was a pulpzine called *HOMBRES DEL FUTURO* (The Futuremen) patterned after the American pulps, *THRILLING WONDER STORIES*, *STARTLING STORIES*, *CAPTAIN FUTURE* and the like. It lasted only three issues. The next one was a Spanish version of the Italian prozine, *URANIA*, which lasted two issues and was published in Rosario, the second largest city in Argentina. Neither lasted long enough to create a readership and it was *MAS ALLA* (Beyond) which had the honor of doing so. Although most of the material in *MA* came

from *GALAXY*, it included stories and science articles from many leading foreign magazines and even had at least one story by a local author in most issues after the fifth or sixth. This was, of course, a landmark in Argentine sf which, unfortunately, hasn't been imitated on that scale. *MA* had plenty of advertising and was published by a large Publishing House, Editorial Abril, which brought out several other magazines and books. The first issue came out in June, 1953, and the last in June, 1957, a few months before Sputnik went up. It lasted 48 issues and was the longest-lived professional sf magazine in the Spanish language. It introduced the lettercol where readers, writers and the budding fan met and even had a special section which answered questions of a scientific or technical nature. Now the whole collection or set, 48 issues, costs 10 or 20 times its original cover price and people treasure their collections as if they were "incunables" or works of art. I suppose the same happens with complete sets of *AMAZING*, *FANTASTIC* or *ANALOG*. After Sputnik, we had two short-lived magazines, *GEMINIS*, which wanted to revive *MAS ALLA*, and the Spanish edition of *FANTASY & SCIENCE FICTION*, called *MINOTAURO*. *GEMINIS* lasted only two issues and included the short story by Robert Shekley from which *The Tenth Victim* was made. It also included stories by Argentine authors and planned to run a lettercol which never came into being. It intended to be a fortnightly magazine but later became a monthly and folded. *MINOTAURO* had no advertising at all and published only stories from *F&SF*. It had no illustrations, either. All the others had illustrations and photos and included science articles. *MINOTAURO* folded a couple of years ago; it lasted only ten issues. Now there are no science fiction magazines

published in this country.

I am interested in the issues between 1965 and 1969 of both *AMAZING* and *FANTASTIC* as well as all the reprint magazines and you may include this request in my letter if any of it ever sees print . . . I offer Argentine prozines and books or anything (short of lovely Argentine girls or a Gaucho outfit) they would like to get in exchange.

Hector R. Pessina
Casilla 3869-C. Central
Buenos Aires-Argentina

I trust the publication of your request and offer will bring you fast results, Hector. Hector also publishes the ARGENTINE SCIENCE FICTION REVIEW, which I recommend.

—TW

Dear Mr. White,

I am writing to you for two reasons. One, to let you know I think you're doing a great job with *AMAZING STORIES* and two, to say something to one of your readers who has a letter in the March issue of *AMAZING STORIES*.

First of all what you have done with your mag is truly unbelievable. It has gone from one of the lesser quality mags to one of the best. This thing with the reprint is good too, I wish all the SF magazines would do it. I like all of the fan departments you have installed also. For a newcomer to the field of fandom it is invaluable. Your editorials are good also. I do have a few suggestions though. Ultimate Publishing seems to put out a lot of magazines having just reprints in them. I wonder if you could discontinue those and use the money saved in the printing of those to put *AMAZING* out monthly. I don't know maybe you make money off of them it's just a suggestion. Also the type you use is so small it really makes reading a strain. Why such small type?

Lastly, a Mr. Stein who complained about the fifteen year olds of today because of their limited mentality. He then went on to say that he was reading adult Heinlein then. Well, as a fifteen year old I wish to reply to that. I was reading Adult Heinlein when I was fourteen and I have friends who were reading it at twelve and thirteen. Maybe I am over reacting but I really think that Mr. Stein should take a good look at some of his local fifteen sear olds.

Bill Andresen
3826 So. Castlerock Rd.
Malibu, Calif.

But we don't lose money on those reprint publications, Bill. The fact is, they help support the more costly-to-produce magazines like AMAZING and FANTASTIC. And we don't plan on monthly publication for the simple reason that it would mean (at least theoretically) only half as much time on sale with each issue. You'll notice one of our monthly competttors just went bimonthly, in fact. Actually Hank Stine was not putting down fifteen-year-olds; reread his letter and you'll find he was castigating the editors who underrate their younger readers. —TW

Dear T. Edward,

Re AMAZING 7/70, p. 119, my own letter: for your own information, the first Norman book and the first "Lange" book both appeared in December, 1966: an apparent coincidence to keep the odds-makers happy. I was aware of the Edwards collaboration (from the other half) (*He means Terry Carr.*—TW), but thanx for confirmation of the Archer name: I had suspected as much when Pyramid originally scheduled the book under your real name, and had had those suspicions heightened when the next White/VA effort introduced a character by the same name. Still, there is only one authority in such cases. I have been told, by the way, that Chrichton is also

a penname, but have no confirmation, nor any indication of what his real name might be.

R. Reginald
2236 S. Hobart Blvd.
Los Angeles, Calif., 90018

Here's the True Story: Dave Van Arnam and I started work on a collaborative novel built around Ron Archer in 1964, and completed it for Pyramid in late 1965. I had earlier used the "Archer" pseudonym in some of the music magazines I was then writing for, usually when they were already overloaded with material under my own name. (Harlan Ellison and I used to write about fifty-percent of 33 GUIDE.) I'd also used the name for fanzine artwork in the '50s. And I had already built up a detective around the name for an eventual stab at the mystery markets (which I have as yet not got around to). In 1966 I was offered the opportunity to write a Lost in Space novelization. I turned it down and suggested Van Arnam for it. Pyramid was willing, but CBS required a better-known author, so I agreed to a "collaboration," with Dave doing most of the writing and getting most of the money, and myself as a front man. I did do some plotting, editing and minor rewriting, but too little to want to put my name on the book. The compromise was to make the by-line "Dave Van Arnam & Ron Archer," an in-joke for everyone who might have read our previous collaboration (Archer's half of the dedication is to the heroine of that previous book). Unfortunately, Pyramid released Lost in Space first, and Sideslip later—some two years after we'd written it. So for most people the joke was lost. Aside from a fanzine review in these pages, I cannot offhand recall anything else Mr. Archer has written, but as you probably know he has appeared in two shorter stories and more are in the works.

—Ted White



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